

STATE WATER RESOURCES CONTROL BOARD

PUBLIC HEARING

1998 BAY-DELTA WATER RIGHTS HEARING

HELD AT
901 P STREET
SACRAMENTO, CALIFORNIA
WEDNESDAY, DECEMBER 9, 1998
9:00 A.M.

Reported by: MARY GALLAGHER, CSR #10749

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8

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1 WEDNESDAY, DECEMBER 9, 1998, 9:00 A.M.

2 SACRAMENTO, CALIFORNIA

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4 C.O. CAFFREY: Good morning, all. We are back, still
5 in Phase V. And we are going to hear the rebuttal case of
6 the Department of Water Resources this morning, I believe.

7 Is that correct, Mr. Sandino?

8 MR. SANDINO: Yes, it is.

9 C.O. CAFFREY: Good morning, sir, and welcome.

10 Welcome, Mr. Ford.

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12 REBUTTAL CASE OF THE DEPARTMENT OF WATER RESOURCES

13 BY DAVID SANDINO

14 MR. SANDINO: Good morning, Members of the Board.

15 David Sandino for the Department of Water Resources. The
16 Board has asked that the parties presenting a rebuttal case
17 explain the purpose of rebuttal and whose testimony it is
18 intended to rebut.

19 We have a short five-minute rebuttal case today.

20 We are bringing back today for rebuttal testimony Mike Ford
21 who is a Department Program Manager for Delta Planning and

22 who testified earlier during our case in chief for Phase V.
23 The purpose of his testimony today is to rebut the
24 testimony presented by Mr. Vandenberg of the Department of
25 Interior that in his opinion that the Department's

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1 monitoring report for our Temporary Barrier Program show
2 that the barriers do not improve water quality in the South
3 Delta.

4 Mr. Ford's testimony will be to the contrary
5 today. He will testify that the monitoring reports do not,
6 in fact, show this. And that he will also testify about
7 how we reached our conclusions about the water quality
8 benefits of our South Delta Barrier Program.

9 We have handed out copies of Mr. Ford's rebuttal
10 testimony to the Board staff and also to the Board Members.
11 We also have copies in the back that Mr. Rangchi is passing
12 out if people are interested in following along.

13 C.O. CAFFREY: Please, proceed, Mr. Sandino.

14 MR. SANDINO: Okay. With that I will present to you
15 Mr. Ford, again.

16 Please state your full name for the record.

17 MR. FORD: John Michael Ford.

18 MR. SANDINO: Did you have the opportunity to hear
19 the testimony of Mr. Vandenberg of the Department of
20 Interior?

21 MR. FORD: Yes, I did.

22 MR. SANDINO: You have in front of you I see
23 Department of Water Resources Exhibit 40, which is the
24 Department's Phase V rebuttal testimony relating to South
25 Delta salinity objectives and dissolved oxygen objectives

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1 in the San Joaquin River. Did you prepare this testimony?

2 MR. FORD: Yes, I did.

3 MR. SANDINO: Is this Exhibit 40 a true and correct
4 copy of your testimony?

5 MR. FORD: Yes, it is.

6 MR. SANDINO: Would you please present that testimony
7 to the Board?

8 MR. FORD: Good morning, Chairman Caffrey and Members
9 of the Board, Board staff. The purpose of my rebuttal
10 before the Board today is to clarify whether the South
11 Delta barriers do, in fact, provide water quality benefits.
12 To begin with I'd like to explain why direct measurements
13 of salinities in the Delta cannot be used to determine the
14 net salinity improvement which the barriers provide.

15 As I have stated in my previous testimony,
16 salinity in the South Delta is influenced by many factors
17 including daily tidal variations, Vernalis water quality,
18 the amount and quality of agricultural return flows in the
19 South Delta itself and SWP and CVP export pumping. All
20 these factors change routinely.

21 Measurements of field salinity data taken before

22 and after the barriers are operating will reflect the
23 affects of the barriers, but they will also reflect changes
24 in salinity which have occurred as a result of changes in
25 these other factors. For this reason it is not possible to

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1 separate the incremental water quality benefit in the South
2 Delta provided by the barriers from the salinity affects of
3 other factors.

4 Both DWR and the South Delta Water Agency
5 recognized this fact many years ago. And it is the reason
6 why the draft settlement agreement between DWR and SDWA
7 does not contain any specific performance criteria for
8 salinity levels. Instead, DWR and SDWA relied on Delta
9 model runs which show the barriers improve water quality
10 for any given set of export agricultural return flows and
11 Vernalis flow and water quality.

12 I'd like to briefly address the wording in the
13 monitor reports that Mr. Vandenberg referred to in his
14 testimony. He referred to several portions of monitoring
15 reports which stated that the barriers did not proceed any
16 major changes in water quality as measured immediately
17 upstream and downstream of barrier locations.

18 From these statements he concluded that the
19 reports demonstrated that there were no water quality
20 benefits provided by the barriers. Again, as I testified
21 in my direct testimony, the barriers operate by

22 transporting water from the downstream end to the upstream
23 on the flood tide and preventing any upstream to downstream
24 flow on the ebb tide.

25 As a result one would expect that since the

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1 barriers are constantly replacing upstream water with
2 downstream water, that water quality measurements upstream
3 and downstream would be very similar. And this is, in
4 fact, exactly what the data shows and the monitoring
5 reports describe.

6 In fairness to Mr. Vandenberg, after reviewing
7 these reports myself I have concluded that some of the
8 wording in these reports could surely have been improved.
9 However, the analysis in the reports does not support his
10 conclusion that the barriers do not improve water quality.
11 Rather the analysis shows that no large salinity gradients
12 exist across the barrier from upstream to downstream which
13 is to be expected.

14 So in summary, my testimony that the barriers
15 improve water quality in the South Delta is based on a
16 comparison of the with-project case versus the no-project
17 case. Because of the complex and dynamic nature of factors
18 affecting realtime Delta water quality, it is not possible
19 to verify nor refute the improvement on the basis of actual
20 salinity data. Rather, as a practical matter, we must rely
21 on other tools such as Delta models to quantify these

22 changes.

23 Also, the data in the monitoring reports simply

24 show that there's no significant salinity gradient upstream

25 and downstream of the barriers, which is to be expected and

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1 which is also predicted by Delta models. This data,
2 however, does not support the conclusion that the barriers
3 do not improve water quality as testified to by
4 Mr. Vandenberg.

5 And that completes my rebuttal.

6 C.O. CAFFREY: All right. Thank you, sir. Anything
7 else on direct, Mr. Sandino?

8 MR. SANDINO: No.

9 C.O. CAFFREY: All right. By a showing of hands,
10 which of the parties wish to cross-examine this witness?
11 Mr. Herrick. Any other cross-examiners? You're an
12 exclusive club this morning, Mr. Herrick. I only have
13 Mr. Herrick to cross-examine; is that correct?

14 All right. Please, come forward, Mr. Herrick.

15 Good morning to you, sir.

16 ---oOo---

17 CROSS-EXAMINATION OF THE DEPARTMENT OF WATER
RESOURCES

18 BY SOUTH DELTA WATER AGENCY

19 BY JOHN HERRICK

20 MR. HERRICK: Good morning, Mr. Chairman, Board

21 Members, John Herrick for the South Delta Water Agency.

22 Mr. Ford, one of the project goals of the ISDP is
23 to improve South Delta water quality; is that correct?
24 MR. FORD: Actually, the goal is to improve water
25 circulation. As I said earlier, there's implied in that

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1 that there is an improvement in the water quality but
2 without specifically guaranteeing that the barriers will
3 result in any specific target water quality.

4 MR. HERRICK: And the modeling done for the
5 environmental report indicates that the improvement in
6 water -- in flows will improve water quality; is that
7 correct?

8 MR. FORD: Yes, it does.

9 MR. HERRICK: And is there any data that's been
10 generated from your sampling over the past few years that
11 would indicate that that would not occur, the improvement
12 in water quality?

13 MR. FORD: No.

14 MR. HERRICK: That's all I have. Thank you.

15 C.O. CAFFREY: Thank you. Thank you, Mr. Herrick.

16 Do you have any redirect rebuttal, Mr. Sandino?

17 MR. SANDINO: No, I don't.

18 C.O. CAFFREY: All right. Do you have any -- is this
19 a new exhibit?

20 MR. SANDINO: This is a new exhibit.

21 C.O. CAFFREY: Of course it is. What am I saying?

22 Did you wish to offer it now?

23 MR. SANDINO: Did you want to ask the Board staff or

24 Board Members --

25 C.O. CAFFREY: You're numbering it as DWR 40?

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1 MR. SANDINO: Yes. Do they have any questions?

2 C.O. CAFFREY: I'm sorry. Cross by staff? Anything,
3 Mr. Howard and Ms. Leidigh?

4 MS. LEIDIGH: No.

5 C.O. CAFFREY: And from the Board Members? Excuse
6 me, I'm a little slow this morning.

7 C.O. STUBCHAER: Too quick.

8 C.O. CAFFREY: Too quick, see I don't know if I'm too
9 quick or slow. All right. Nothing from the staff and
10 nothing from the Board Members.

11 Now, we can offer the evidence. We have DWR 40
12 here. I'm sure that's an appropriate number, unless the
13 staff tells us otherwise.

14 MR. HOWARD: That is correct.

15 C.O. CAFFREY: Is there any objection from any of the
16 parties from accepting into the record Exhibit DWR 40 as
17 offered by Mr. Sandino? Hearing and seeing no objection,
18 it is accepted into the record.

19 Thank you, Mr. Ford. Thank you, Mr. Sandino.

20 MR. SANDINO: Thank you.

21 C.O. STUBCHAER: You set a time record I think,

22 Mr. Sandino.

23 C.O. CAFFREY: Yeah. Actually, I think we got
24 through that a lot sooner than Mr. Birmingham had thought
25 we would. And does this now take us, looking at the

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1 schedule provided to us through Mr. Minasian by I believe
2 the entire group, I believe that now takes us back to
3 Mr. Johnston and cross-examination.

4 Mr. Herrick, sir?

5 MR. HERRICK: Just as an update, Mr. Minasian was
6 kind enough to coordinate with everybody about projected
7 witnesses. I went home last night and talked to some of
8 the witnesses. I'll not be putting on Mr. Satkowski. And
9 Mr. Alvarez tells me he's not available today or tomorrow.
10 So I have Alex Hildebrand and Mr. Alvarez scheduled as
11 rebuttal witnesses, but neither one is available until
12 Tuesday.

13 C.O. CAFFREY: Well, we'll certainly accommodate you,
14 sir. Sometimes we move with dispatch, other times we
15 don't. So there's every reason to believe, though, that
16 this may take us a while. So we'll figure out a way to
17 accommodate you when your witnesses are actually here.

18 MR. HERRICK: I appreciate that very much.
19 Mr. Hildebrand, just for the record, is involved in the
20 CalFed Ops meeting and other CalFed meetings and unable,
21 unfortunately, to show.

22 C.O. CAFFREY: Hearing that he might even prefer to
23 be here, who knows. All right. Thank you, Mr. Herrick.
24 Let's see, I had then Ms. Cahill to cross-examine
25 Mr. Johnston.

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1 ---oOo---

2 CROSS-EXAMINATION OF WESTLANDS WATER DISTRICT

3 BY THE CITY OF STOCKTON

4 BY VIRGINIA CAHILL

5 MS. CAHILL: Yes, thank you. Good morning.

6 Good morning, Mr. Johnston.

7 MR. JOHNSTON: Good morning.

8 MS. CAHILL: I'm Virginia Cahill representing the
9 City of Stockton. I have just a few questions. I believe
10 it was your testimony that those areas in Westlands that
11 were formerly served by a portion of the San Luis Drain
12 were now using on-farm practices to handle their tailwater;
13 is that correct?

14 MR. JOHNSTON: I believe I testified that all of the
15 farms in Westlands's Water District, including those in the
16 area that were formerly drained, use on-farm tailwater
17 management.

18 MS. CAHILL: And could you describe for us what some
19 of the practices are that enable those farms to handle
20 their own tailwater on-site?

21 MR. JOHNSTON: They have constructed ponds that

22 collect the tailwater at the lower end of their farm. And
23 then they have pumps and pipelines that return the water to
24 the fields that are being irrigated. Whether it's the same
25 field or another field, they have the ability to recycle

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1 the tailwater on their own land.

2 MS. CAHILL: And is it entirely used through
3 recycling?

4 MR. JOHNSTON: Most of it would be. I mean the ponds
5 don't have the capacity to just continue to accumulate
6 tailwater, so they have to distribute it back on the farm.

7 MS. CAHILL: Okay. And do they use evaporation as
8 well?

9 MR. JOHNSTON: Well, there is evaporation taking
10 place all the time.

11 MS. CAHILL: But it's incidental, that is the purpose
12 of the pond?

13 MR. JOHNSTON: That's correct.

14 MS. CAHILL: And are there other practices that they
15 use, or is that --

16 MR. JOHNSTON: Well, that's the basic purpose of that
17 practice of recycling, yes.

18 MS. CAHILL: And with regard to the areas that were
19 formerly served by the drain, how do they now handle their
20 tile water?

21 MR. JOHNSTON: I haven't been out in the area

22 probably for five years, but to my knowledge those that
23 still have functioning on-farm drains, they recycle that
24 drainage water along with the tailwater and mix it back in
25 the irrigation supply and reapply it to the land.

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1 MS. CAHILL: Okay. And is that the primary practice
2 that's used, then, for tailwater?

3 MR. JOHNSTON: For tile water?

4 MS. CAHILL: Tile water, I'm sorry, yes.

5 MR. JOHNSTON: For those that have on-farm drains
6 that are still functioning in the area that was formerly
7 served by the drainage collection system, that is correct.

8 There is one farmer outside of that area that has
9 some on-farm drains with a practice of irrigating trees and
10 then halophytes. And then he has a small area which he
11 evaporates the concentrated drainage water that he has
12 remaining after using it on trees and halophytes and
13 things.

14 MS. CAHILL: And could the practices used in
15 Westlands be used in other areas on the west side of the
16 San Joaquin Valley?

17 MR. JOHNSTON: Yes. And I believe that they are used
18 in many areas.

19 MS. CAHILL: Thank you. The last line of questions
20 has to do with a question that Mr. Birmingham asked you
21 about treating drain water for selenium if the valley drain

22 were to be constructed.

23 And I believe your testimony was that the data

24 shows that the selenium context of drainage water can be

25 reduced to a point clear. With dilution and dispersion it

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1 could be discharged near Pittsburgh to meet water quality
2 standards.

3 Was that your testimony?

4 MR. JOHNSTON: Yes, it was.

5 MS. CAHILL: Is there a distinction between dilution
6 and dispersion and could you explain what you mean by both
7 of those?

8 MR. JOHNSTON: Well, dilution is the ability of the
9 receiving water to reduce the quantity of the element that
10 you're interested in to a -- from the concentration that's
11 in the discharge to the concentration that meets the
12 objective in the receiving water. Dispersion is the
13 physical process of spreading this water throughout the
14 receiving body.

15 MS. CAHILL: Okay. And so the dilution flows they
16 come entirely from the receiving water; is that right?
17 Let me put it a different way.

18 MR. JOHNSTON: Yes.

19 MS. CAHILL: Let me ask it --

20 MR. JOHNSTON: The answer is yes.

21 MS. CAHILL: Okay. In other words, after the drain

22 water is treated for selenium there isn't dilution water
23 added before it's discharged, you are going to be relying
24 on the amount, or the ability of the receiving water to
25 dilute it?

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1 MR. JOHNSTON: That's correct.

2 MS. CAHILL: Could the same treatment techniques for
3 selenium be used prior to discharges of drainage water
4 directly into the San Joaquin River?

5 MR. JOHNSTON: Yes. The problem with that is the
6 treatment process for removing and reducing selenium
7 doesn't do anything to the salt content of the water. And
8 you would still have highly-saline water.

9 MS. CAHILL: Okay. Let me break this into pieces.
10 If you treated drain water for selenium and then discharged
11 it into the San Joaquin River, for example at Mud Slough,
12 would there be sufficient dilution capacity in the
13 receiving waters at Mud Slough to get the proper dilution?

14 MR. JOHNSTON: No.

15 MS. CAHILL: So if you did that, even with treatment
16 you might not meet the water quality standards; is that
17 right?

18 MR. JOHNSTON: That's most likely, yes.

19 MS. CAHILL: Okay. And then with regard to your
20 second point that there would still be salinity even if you
21 treated selenium, if there were a drain built to Pittsburg

22 would there -- is there proposed to be any treatment for
23 salinity as well?

24 MR. JOHNSTON: No.

25 MS. CAHILL: Is there any need to treat for salinity

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1 at that discharge point?

2 MR. JOHNSTON: Not in my opinion.

3 C.O. CAFFREY: Excuse me. Mr. Del Piero has a
4 question.

5 MEMBER DEL PIERO: Excuse me. Pardon me for
6 interrupting, but what treatment strategy are you referring
7 to when you talk about treating for selenium that doesn't
8 remove the balance of the salts?

9 MR. JOHNSTON: Biological treatment for removal of
10 selenium.

11 MEMBER DEL PIERO: You talking about the wetlands
12 project?

13 MR. JOHNSTON: No. I'm talking about a treatment
14 plant.

15 MEMBER DEL PIERO: Treatment plant?

16 MR. JOHNSTON: With a biological treatment process.

17 MEMBER DEL PIERO: Thank you.

18 MS. CAHILL: Okay. So, so long as drain water is
19 being discharged directly to the San Joaquin River, it
20 appears that it's -- that there is no -- well, I'll have to
21 withdraw that and stop here.

22 Thank you.

23 C.O. CAFFREY: All right. Thank you very much,

24 Ms. Cahill.

25 Is Ms. Harrigfeld here this morning?

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1 MS. CAHILL: She is not. And she told me to tell you
2 that she had no questions.

3 C.O. CAFFREY: All right. Thank you very much,
4 Ms. Cahill.

5 Mr. Howard or Ms. Leidigh, do you have questions?
6 That completes the list of the parties for
7 cross-examination.

8 MS. LEIDIGH: Neither of us has any questions.

9 C.O. CAFFREY: All right. Thank you.

10 MS. LEIDIGH: Well, after the Board Members, perhaps,
11 Westlands would like to offer the exhibit, if there are
12 any.

13 C.O. CAFFREY: We do have a question from the Board
14 after all.

15 Ms. Forster.

16 MEMBER FORSTER: This biological treatment plant that
17 you were talking about, where would that plant be?

18 MR. JOHNSTON: In the report that we submitted --
19 I'll get the number, Westlands 27 which was prepared by the
20 litigation and for this Board, we contemplated that the
21 treatment plant would be at the lower end of Westlands'

22 Water District somewhere, because that's the water that we
23 would be treating.
24 If a drain was constructed that served other
25 areas, the treatment plant would have to be somewhere

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1 between the last point of collection of high selenium
2 content water and the discharge point. So it would be
3 along the drain someplace.

4 Now, we also contemplated controlling the drainage
5 water at the source so that we could shut it off if there
6 was any problems either with the discharge or the treatment
7 process and would not rely on regulating reservoir as was
8 contemplated with Kesterson.

9 MEMBER FORSTER: If I review your Exhibit Number 27,
10 which I'll do in a minute, have you looked at the
11 consideration of a biological treatment plant to build down
12 what Mr. Del Piero said, would it be possible, have you
13 looked at options for also looking at the salinity
14 problems, are they technologically feasible but not
15 economically feasible, or is it it hasn't been designed or
16 created yet?

17 MR. JOHNSTON: Desalting or the removal of salinity
18 from water is technically feasible. The Department of
19 Water Resources had a pilot project in Los Banos a number
20 of years and found that they could remove salinity from the
21 drainage water.

22 However, it's much more difficult than removing
23 sodium chloride from seawater because they're different
24 salt, different quantities of various salts. So it makes
25 it more difficult. It's very expensive. So whether it's

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1 economically feasible or not, I don't know. There's been a
2 number of breakthroughs in types of membrane that are
3 available, and so what was a problem 10 or 15 years ago may
4 have been overcome. I don't know the latest in that.

5 MEMBER FORSTER: And will --

6 MR. JOHNSTON: But if you desalt the water you end up
7 with a big pile of salt or a brine that needs to be
8 disposed of. So if you can get the selenium out of the
9 water so that you can safely pond it, you could evaporate
10 it, but those are technical problems that haven't been
11 resolved yet.

12 MEMBER FORSTER: I have one follow-up question: Will
13 the EIR that's proposed to be done on the ag drainage, that
14 will probably address all these different issues, right?

15 MR. JOHNSTON: I would hope it would, yes.

16 MEMBER FORSTER: And do we have a status, I haven't
17 heard anything in the past few days of testimony, the
18 lawsuit and all that, has that come to a conclusion yet?

19 MR. JOHNSTON: To my knowledge the Bureau of
20 Reclamation's appeal of Judge Wanger's decision is still
21 pending before the appeals court.

22 MEMBER FORSTER: Thank you.

23 C.O. CAFFREY: Mr. Del Piero.

24 MEMBER DEL PIERO: Mr. Johnston, in the cases of

25 desalinization facilities around the state, where is the

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1 brine normally disposed of?

2 MR. JOHNSTON: Well, most of the desalinization
3 plants are along the coast so that the brine is just put
4 back into the ocean.

5 MEMBER DEL PIERO: Okay. And in the event that they
6 are not in other areas, where does the brine normally go?

7 MR. JOHNSTON: I don't know.

8 MEMBER DEL PIERO: Would it be unreasonable to assume
9 that it would go to a landfill?

10 MR. JOHNSTON: We're talking about very large
11 quantities of brine --

12 MEMBER DEL PIERO: Of water?

13 MR. JOHNSTON: Yes.

14 MEMBER DEL PIERO: And of salt?

15 MR. JOHNSTON: Yes.

16 MEMBER DEL PIERO: How many large quantities of salt?

17 MR. JOHNSTON: Many tons, thousands of tons.

18 MEMBER DEL PIERO: Okay. Would it be unreasonable
19 for that to go to a landfill?

20 MR. JOHNSTON: I think it might. I don't have any
21 cost figures on that, but I think quantity-wise it would

22 be --

23 MEMBER DEL PIERO: Is there any legal impediment to

24 it going to a landfill?

25 MR. JOHNSTON: No.

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1 MEMBER DEL PIERO: Okay. Is it common for materials
2 like that to be disposed of in the event --

3 MR. JOHNSTON: Of course.

4 MEMBER DEL PIERO: -- there's determined to be waste
5 materials in the landfill?

6 MR. JOHNSTON: Yes.

7 MEMBER DEL PIERO: So in the terms of the economics,
8 the economics are a function of how bad you want to get rid
9 of it; isn't that correct?

10 MR. JOHNSTON: Well, the economics are what they are.
11 However, I think that because of the large volume of
12 material we're talking about, it may be economically
13 infeasible to move it to a landfill.

14 MEMBER DEL PIERO: And you base that on what?

15 MR. JOHNSTON: Just my understanding of the amounts
16 of material that would be involved.

17 MEMBER DEL PIERO: And --

18 MR. JOHNSTON: And the amount of water that we're
19 talking about. I mean we've talked about all sorts of
20 different ways of getting rid of it. If you concentrate
21 the brine enough you could have a pipeline that takes it to

22 the Delta and you could put it on a barge and haul it out
23 in the middle of the ocean and dump it. But, you know,
24 that's -- there's a lot of liquid -- or a lot of dry
25 material that needs to be handled.

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1 MEMBER DEL PIERO: Why would you -- if it's dry
2 material, if the water has been removed from it, why would
3 you put it on a barge and dump it in the ocean?

4 MR. JOHNSTON: You cannot -- you cannot get -- unless
5 you spread it and evaporate it, you can't get it down to a
6 dry material.

7 MEMBER DEL PIERO: I understand that. Is that not
8 the common practice in terms of the removal of salts or
9 brine material?

10 MR. JOHNSTON: Yes.

11 MEMBER DEL PIERO: It's not common for brine other
12 than discharges into the ocean for brine to be left in a
13 solution. Normally it's dried out and disposed of the
14 inert material that way.

15 MR. JOHNSTON: So far we haven't developed a
16 technique to remove selenium down to a less than two part
17 per billion level, which is required for evaporation basins
18 in the San Joaquin Valley to protect wildlife.

19 Even with desalting and selenium removal we would
20 probably still have selenium concentrations that would
21 exceed the limit, the allowable limits for ponding water.

22 And we would be talking about large areas of ponds to deal
23 with this much drainage water.
24 MEMBER DEL PIERO: So how would you deal with the
25 discharge then in the event that you would discharge it

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1 into a drain? How would you deal with that underlying
2 selenium problem if your solution is then dilution based on
3 an absence of any kind of background selenium content in
4 the water near Pittsburg?

5 MR. JOHNSTON: The --

6 MEMBER DEL PIERO: That's not the case. I mean
7 there's elevated selenium content levels based on the San
8 Francisco Regional Water Quality Control Board's estimates
9 in that area.

10 MR. JOHNSTON: The current objective is 2 parts per
11 billion. The biological process can remove selenium down
12 to less than 20 parts per billion. With a 10-to-1 dilution
13 factor and dispersion in the receiving water we can meet
14 the 2 part per billion objective.

15 MEMBER DEL PIERO: Assuming no background selenium
16 content in the discharging water, in the water that you use
17 for dilution purposes?

18 MR. JOHNSTON: No. The modeling result in Westlands'
19 27 show we can meet that. There are -- there is selenium in
20 the -- I mean there's a background selenium content in the
21 bay water.

22 MEMBER DEL PIERO: And it's posing a serious problem.
23 I mean the San Francisco Regional Water Quality Control
24 Board has been dealing with that issue for the better part
25 of several years now.

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1 MR. JOHNSTON: I understand.

2 MEMBER DEL PIERO: What aspect of modeling did you
3 all do to determine that it was capable of discharging
4 without elevating it above the elements?

5 MR. JOHNSTON: Well, the flow science people did the
6 modeling for Westlands. And it's reported in Westlands'
7 27. And there's a figure showing maximum selenium
8 concentrations in parts per billion with a discharge of --
9 maximum of 60 million gallons per day showing a .704 parts
10 per billion selenium with a 10-percent dilution.

11 C.O. CAFFREY: Excuse me, Mr. Johnston, is that 60,
12 or 16?

13 MEMBER DEL PIERO: 60 million.

14 C.O. CAFFREY: It sounded like 60 million; is that
15 correct?

16 MR. JOHNSTON: That's correct.

17 C.O. CAFFREY: All right. Thank you, sir.

18 MEMBER DEL PIERO: And did they compare that to the
19 background levels of the studies done by the San Francisco
20 Regional Board?

21 MR. JOHNSTON: Well, I assume when John List did his

22 modeling he used the appropriate concentration for the bay

23 water.

24 MEMBER DEL PIERO: The reason I ask that question is

25 because I don't think it's simple. The Central Valley

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1 Regional Board has done the selenium water levels as this
2 Board has done. Does our staff know?

3 Mr. Howard, do you know whether or not they
4 utilized the San Francisco Regional Water Quality Control
5 Board's information on selenium when they did this model?

6 MR. HOWARD: No.

7 MS. LEIDIGH: No.

8 MR. JOHNSTON: I think they did.

9 MEMBER DEL PIERO: Mr. Chairman, rather than belabor
10 this point, I'd like to ask that our staff do that. And in
11 the event that it's not, they can advise us whether or not
12 that report actually incorporated that information from San
13 Francisco, or just relied on the background data that the
14 Central Valley Board had. I'd appreciate it.

15 C.O. CAFFREY: Ms. Leidigh, do you have any comments
16 about that with regard to the evidentiary record?

17 MS. LEIDIGH: I think that the material sample really
18 is more relevant to the proceeding that will be coming up
19 on the San Luis Drain. If we get additional exhibits, at
20 this point I think they'd have to become part of the record
21 and we have to deal with parties having an opportunity to

22 look at them and not -- it probably would go beyond the
23 scope of this hearing.
24 C.O. CAFFREY: But is there any problem, I mean
25 recognizing that fact since it has been referring more --

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1 not so much, if you'll forgive me, not to the relevancy but
2 just to the procedure of getting that information, I'm not
3 sure if it's evidence or what it is, but I want to
4 accommodate Mr. Del Piero in any way that I can.

5 MEMBER DEL PIERO: Mr. Chairman, the reason I'm
6 raising the issue is if you look around the room and you've
7 looked around it for several months now --

8 C.O. CAFFREY: Oh, believe me, I have.

9 MEMBER DEL PIERO: There's a noticeable absence of
10 representatives from the San Francisco Bay Area that's
11 equally as concerned, as you know, by the fact they show up
12 every month, they're equally concerned about selenium.

13 This issue being raised about potential for
14 discharge within a stone's throw of the boundary lines
15 between the Central Valley Regional Water Quality Control
16 Board's jurisdiction and the San Francisco Bay Area
17 Regional Water Quality Control Board's jurisdiction is an
18 issue that ultimately is going to be confronting this
19 Board.

20 Whether it's as a result of the hearing on the
21 drain, or as part of this, I'm just concerned that if there

22 is no -- if this modeling was done without the new
23 information that has been produced in the last 24 months in
24 San Francisco it leaves something of a worn spot in terms
25 of our evidentiary record, that's the reason I'm raising

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1 the issue, Mr. Chairman, and I'm not going to belabor it.

2 C.O. CAFFREY: I understand your concerns and I want
3 to make sure we handle the evidentiary record correctly.
4 And since we're in rebuttal testimony here, I'm not sure
5 how this is -- the reason for my question to Ms. Leidigh
6 was I just didn't want to do something improper with the
7 record.

8 And you answered that this material might be more
9 appropriate in the other record. But that wasn't really
10 what I was seeking. I was seeking to know regardless of
11 the relevancy, was there anything you could add for us
12 about a Board Member asking for a particular document which
13 really isn't relevant, per se, to the evidence that's
14 before us now in the sense of we're in rebuttal testimony
15 and it's not being offered by them.

16 MS. LEIDIGH: No --

17 MEMBER DEL PIERO: Mr. Chairman, I'm not asking for a
18 document to be entered into the record. I'm simply asking
19 whether or not, because Mr. Johnston doesn't know at this
20 point and our staff does not either, whether or not those
21 documents were used as part of the modeling effort that was

22 done to produce the evidentiary exhibit. That's why I was
23 asking.
24 C.O. CAFFREY: Now, I understand what you're asking
25 and I think we may have an answer, because Mr. Johnston is

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1 raising -- he may have found a reference.

2 Mr. Johnston.

3 MR. JOHNSTON: Yes. I was reading through the report
4 by John List that's contained in Westlands' 27 and there's
5 a discussion about the modeling numbers and the flows and
6 everything. But then there's a sentence that says,
7 (Reading):

8 "These numbers were used because we actually had
9 files available that had been accepted by the
10 San Francisco Regional Water Quality Board as
11 representative of the worse-case condition when
12 we were doing work for Chevron Oil Company."

13 So John was aware of the --

14 MEMBER DEL PIERO: Do you know what the dates were on
15 those reports, because there was a series of reports
16 accepted in the early '90s and then there's a series that
17 have come in in the last 24 months?

18 MR. JOHNSTON: This was --

19 MEMBER DEL PIERO: What's the date on it?

20 MR. JOHNSTON: This report was carried out and
21 prepared in 1995.

22 MEMBER DEL PIERO: Okay.

23 C.O. CAFFREY: All right. Thank you, Mr. Johnston.

24 Thank you, Mr. Del Piero.

25 We have questions from Mr. Brown. Mr. Brown, sir.

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1 MEMBER BROWN: Mr. Johnston, we can get on the record
2 I believe a rough engineer's estimate of the volume of salt
3 that we're talking about from Mr. Del Piero which might be
4 important.

5 The west side irrigates about how many acres would
6 you say, Westlands has about 600,000?

7 MR. JOHNSTON: Right. The volume itself you want to
8 discuss pertains to the drainage water or to the
9 irrigation?

10 MEMBER BROWN: Let's talk about the importation of
11 salt and the imbalance of supply of salt versus disposal
12 just to get it in the ballpark.

13 MR. JOHNSTON: Well, there's probably close to a
14 million acres Westlands north that's irrigated.

15 MEMBER BROWN: All right. You have a million acres
16 and they actually use --

17 MEMBER DEL PIERO: John, a million acres doesn't get
18 to the drain.

19 MEMBER BROWN: Well, it's --

20 MEMBER DEL PIERO: That will get to the drain.
21 Mr. Birmingham is religious about telling us about that.

22 MEMBER BROWN: I'm talking about salt imbalance,
23 we're not talking the drainage into the drain.
24 MEMBER DEL PIERO: Okay.
25 MEMBER BROWN: Just the imbalance of salt that occurs

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1 that is the problem eventually, which I thought was what
2 your question was.

3 If you're talking about a million acres, the
4 application rate of water to those lands is about, what, 3
5 acre-feet per acre?

6 MR. JOHNSTON: Approximately.

7 MEMBER BROWN: So you're talking about 3,000,000
8 acre-feet annually. What's the salinity of that water on
9 the average?

10 MR. JOHNSTON: Well, it's probably about a ton per
11 acre-foot roughly.

12 MEMBER BROWN: A ton per acre-foot is 750 parts per
13 million?

14 MR. JOHNSTON: Yeah.

15 MEMBER BROWN: I don't think it runs that high, does
16 it?

17 MR. JOHNSTON: Counting groundwater that's used and
18 everything else it would be close to it.

19 MEMBER BROWN: So the applied water average TDS is
20 about 700 parts per million?

21 MR. JOHNSTON: Say half of that. Say there's a half

22 a ton per acre.

23 MEMBER BROWN: Yeah, that might be. So if it's half

24 a ton per acre-foot and you're irrigating with 3,000,000

25 acre-feet, what's that?

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1 MR. JOHNSTON: A million and a half tons.

2 MEMBER BROWN: More than that. Yeah, about a million
3 and a half tons. And the volume of that yardage-wise is it
4 about like sand, one ton per yard maybe?

5 MR. JOHNSTON: Yeah, probably.

6 MEMBER BROWN: So a million and a half yards. That's
7 the importation problem.

8 MEMBER DEL PIERO: I understand that, but the reality
9 is a million and a half yards per year doesn't amount to
10 diddly in the landfill.

11 MEMBER BROWN: Okay. Then, that's the answer.

12 MEMBER DEL PIERO: That was the point that I was
13 attempting to arrive at. Even if you reduce it all down
14 even though the numbers are very, very large, that the
15 reality is that if you dewater that material it doesn't
16 amount to a heck of a lot in terms of disposal in
17 landfills. A million and a half tons --

18 MEMBER BROWN: This is solid product. Isn't it,
19 Mr. Johnston, it is solid product?

20 MR. JOHNSTON: Yeah.

21 C.O. CAFFREY: Let's make sure we're questioning the

22 witness, as Mr. Brown has just done. Thank you,

23 Mr. Brown.

24 MEMBER BROWN: In any case, is that the nut that

25 needs to be cracked?

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1 MR. JOHNSTON: Well, that's the imported supply. And
2 you would, certainly, like to take more than that over a
3 long period of time to achieve some sort of a salt balance.

4 MEMBER BROWN: I'll ask you another series of
5 questions on a different related problem as to agricultural
6 potential on these lands and the cost of lack of drainage
7 as it relates to the capacity you were discussing earlier
8 in the cropping pattern limitations that you were
9 discussing earlier.

10 MR. JOHNSTON: Yes.

11 MEMBER BROWN: Is there any phytopera, or root rot on
12 any of the permanent crops in that area that you're aware
13 of in the high groundwater table?

14 MR. JOHNSTON: I have heard that discussed, but I'm
15 not a plant physiologist, or a person that would be
16 qualified to answer.

17 MEMBER BROWN: You don't know?

18 MR. JOHNSTON: I would say, yes, there are those
19 problems, but to the extent that they're causing crop
20 reduction problems, I don't know.

21 MEMBER BROWN: Are permanent crops limited due to

22 high groundwater?

23 MR. JOHNSTON: Yes.

24 MEMBER BROWN: What crops that are salt sensitive are

25 you raising now, the majority of them?

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1 MR. JOHNSTON: Well, there are a lot of almonds grown
2 on the west side. And almonds cannot be grown in the types
3 of soils that we've been discussing with drainage problems.

4 MEMBER BROWN: What crops are you growing, mainly
5 growing?

6 MR. JOHNSTON: Mainly grown in these areas cotton,
7 sugar beets, safflower.

8 MEMBER BROWN: All right. What's the average payment
9 capacity of those crops as you estimate?

10 MR. JOHNSTON: As of today I don't know. I mean I
11 haven't reviewed the economics of this for a number of
12 years. So I would be guessing if I gave you any kind of
13 figure. We did a study probably 20 years ago showing
14 the -- comparing the returns on land with five-foot water
15 table with water -- with the returns on the land with no
16 water table. And if I recall it was somewhere around \$200
17 per acre difference in the ability of the land to produce.

18 MEMBER BROWN: Have you looked at the payment
19 capacity of permanent crops, vines, tree trunks?

20 MR. JOHNSTON: No, I haven't.

21 MEMBER BROWN: Any analysis, ergonomic analysis?

22 MR. JOHNSTON: No.

23 MEMBER BROWN: Do you have an idea what the spread

24 between grow crops, field crops and permanent crops are in

25 payment capacity, the potential?

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1 MR. JOHNSTON: Well, it's quite large, but as I said,
2 I don't know the details. I know that, certainly, a farmer
3 growing almonds or grapes could have a substantially higher
4 return than someone growing cotton and wheat.

5 MEMBER BROWN: If these lands were properly drained
6 by whatever means, that would be suitable for the
7 environment and such, would the soils, the climate and the
8 water be suitable for higher value of crops?

9 MR. JOHNSTON: Yes.

10 MEMBER BROWN: Is there a potential there that's
11 being missed in payment-capacity growth?

12 MR. JOHNSTON: There is definitely a potential that's
13 being missed by a lack of drainage, certainly.

14 MEMBER BROWN: Have you or any of your associates
15 ever pen that out?

16 MR. JOHNSTON: I'm sure that the University of
17 California economists have spent some time looking at this.
18 And I recall seeing some articles in California Agriculture
19 from time to time where this issue has been discussed, but
20 I don't have those numbers at my fingertips.

21 MEMBER BROWN: Are you familiar with calcium

22 carbonate?

23 MR. JOHNSTON: Yes.

24 MEMBER BROWN: Is that normally termed "white

25 alkali"?

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1 MR. JOHNSTON: Yes.

2 MEMBER BROWN: Through the osmosis or the process of
3 capillary action if you quit irrigating a field, does white
4 alkali have a tendency to perk to the surface of the land?

5 MR. JOHNSTON: If the water table is close enough to
6 the groundwater it will and a lot of it will be sodium
7 sulfate on the west side.

8 MEMBER BROWN: Is there much black alkali, or sodium
9 sulfate in the Delta Westlands, or is it mainly white
10 alkali?

11 MR. JOHNSTON: It's mostly sodium sulfate on the west
12 side, but it's not -- the black alkali would be -- you get
13 carbonate and sulfates. So it's a mixture on the west
14 side.

15 MEMBER BROWN: With proper drainage is the calcium
16 carbonate reclaimable?

17 MR. JOHNSTON: Calcium sulfate is the predominant ion
18 or gypsum on the west side. And they require gypsum to
19 open the soil up to get better water penetration.

20 MEMBER BROWN: So if you reclaim these lands would
21 that improve the suitability for higher value crops?

22 MR. JOHNSTON: Yes.

23 MEMBER BROWN: Okay. That's all, Mr. Chairman.

24 C.O. CAFFREY: Thank you, Mr. Brown.

25 Mr. Del Piero, you had another question, sir?

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1 MEMBER DEL PIERO: Yes. Mr. Johnston, how many acres
2 did you say are within Westlands?

3 MR. JOHNSTON: Roughly 600,000 acres.

4 MEMBER DEL PIERO: 600,000.

5 MR. JOHNSTON: About 544,000 irrigated.

6 MEMBER DEL PIERO: And the proposal at least in the
7 study that was produced for the litigation indicated a
8 maximum discharge of 6,000,000 GPD?

9 MR. JOHNSTON: That's correct.

10 MEMBER DEL PIERO: Help me, poor old attorney of the
11 Board, please, assuming 750 PPM's of TDS, salt, selenium,
12 what have you; is that correct?

13 MR. JOHNSTON: Not for the 60 million gallons.

14 MEMBER DEL PIERO: What is correct?

15 MR. JOHNSTON: That would be closer to 5,000 parts
16 per million.

17 MEMBER DEL PIERO: Okay. Let's assume 5,000, then.
18 Can you tell me what the -- if it's 5,000 PPM's for the 60
19 million, what would be the dry result of that dewatering of
20 that drainage?

21 MR. JOHNSTON: I don't know off the top of my head.

22 MEMBER DEL PIERO: Well, if you don't I sure as heck
23 don't.
24 MR. JOHNSTON: I know. We can get that number,
25 though.

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1 MEMBER DEL PIERO: You came up with that 5,000, that
2 wasn't my figure.

3 MR. JOHNSTON: No, that's right. Actually, the data
4 in the report show that the parts per million that was
5 drained ranged around between 9800 and 11,600. So I was
6 half wrong.

7 MEMBER DEL PIERO: Okay. So it's, let's assume,
8 10,000 PPM's; is that correct?

9 MR. JOHNSTON: Yeah.

10 MEMBER DEL PIERO: It's about a third of seawater; is
11 that right?

12 MR. JOHNSTON: Roughly.

13 MEMBER DEL PIERO: Okay. Is it possible for you to
14 calculate to tell me what the dry residual of that would
15 be?

16 MR. JOHNSTON: Yes, that's possible.

17 C.O. CAFFREY: For the record, this is not your next
18 licensing exam.

19 MR. JOHNSTON: I see.

20 MEMBER DEL PIERO: No, it's not. Mr. Chairman, if
21 the proposed drain's maximum discharge is 6,000,000 GPD's,

22 then calculating what the dry residual of that is will give
23 you a real firm answer as to what the disposal consequence
24 would be in the event that it was run through either
25 reverse osmosis, or some kind of system that eliminated all

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1 that.

2 MR. JOHNSTON: Say 12 to 15 tons per acre-foot and
3 we're talking about --

4 C.O. CAFFREY: You know, if you would like to break
5 for an engineering workshop the rest of us could go out and
6 have some coffee for awhile.

7 MEMBER DEL PIERO: Mr. Chairman --

8 C.O. CAFFREY: I'm teasing these guys over here,
9 Marc. You peaked their interest.

10 C.O. STUBCHAER: We can testify, we can answer the
11 question.

12 C.O. CAFFREY: Yeah, I'll swear the three of you in
13 and we can have some fun.

14 MS. CAHILL: Do we get to cross-examine?

15 C.O. CAFFREY: Yes, you do. Ms. Cahill gets to go
16 first.

17 You have an answer, Mr. Johnston, for
18 Mr. Del Piero?

19 MR. JOHNSTON: Since I'm under oath I think you'd end
20 up somewhere between 350 and 400,000 tons per year.

21 MEMBER DEL PIERO: Per year. And the volume of dry

22 material, can you quantify it for the poor old lawyer
23 that's sitting up here?
24 MR. JOHNSTON: Well, based on our previous
25 discussions, it would be about that many yards of material.

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1 MEMBER DEL PIERO: All right. 400,000 tons, is that
2 as big as a one-story house?

3 MR. JOHNSTON: I don't know. How big 400,000 tons
4 of --

5 MEMBER DEL PIERO: Of dry material, you can't give us
6 a volume on that?

7 MR. JOHNSTON: Well, that many cubic yards --

8 MEMBER BROWN: Mr. Chairman?

9 C.O. CAFFREY: Mr. Del Piero, would you yield to your
10 friend Mr. Brown?

11 MEMBER DEL PIERO: Sure.

12 MEMBER BROWN: Just a half second. You have to get
13 us off this subject, you got Jim Stubchaer and I up here
14 going crazy.

15 C.O. CAFFREY: That's what I just said. Marc, give
16 them a break.

17 MR. BIRMINGHAM: I've always understood,
18 Mr. Chairman, that Board Members are entitled to ask
19 leading questions.

20 C.O. CAFFREY: Leading questions?

21 MR. BIRMINGHAM: Leading questions which suggest by

22 the question the answer that --

23 C.O. CAFFREY: Yeah, but from time to time we try

24 to --

25 MEMBER DEL PIERO: Periodically we try to drive the

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1 engineers crazy.

2 C.O. CAFFREY: Where are we, Mr. Del Piero, you have
3 more questions?

4 MEMBER DEL PIERO: If Mr. Johnston can't give me an
5 answer as to what he estimates the practical example of
6 that volume of material is, that's okay.

7 MR. JOHNSTON: Well, as I said, 400,000 cubic yards,
8 but then now you're trying to get me to give you the size
9 of a building that would hold that.

10 MEMBER DEL PIERO: Yeah.

11 MR. JOHNSTON: Divided by 9 -- I don't know. I'll
12 pass.

13 C.O. CAFFREY: You'll pass on that?

14 MR. JOHNSTON: Yeah.

15 C.O. CAFFREY: Mr. Johnston says he'll pass on that.

16 MEMBER DEL PIERO: That's fine. Mr. Stubchaer and
17 Mr. Brown will give me one.

18 C.O. CAFFREY: They'll let you know.

19 MEMBER DEL PIERO: All right. Thank you very much.

20 C.O. CAFFREY: Thank you, Mr. Del Piero. I was going
21 to ask Ms. Minaberrigarai if she had any redirect, but I'll

22 ask her assistant, Mr. Birmingham.

23 MR. BIRMINGHAM: I do, Mr. Chairman. I wonder if we

24 could take our morning recess at this time to give me an

25 opportunity to confer with Mr. Johnston. Also, I have to

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1 admit that I left my notes for my redirect in my office and
2 Ms. Minaberrigarai just went back to get those.

3 C.O. CAFFREY: Well, we could.

4 MEMBER DEL PIERO: How long is she going to be gone?

5 C.O. CAFFREY: Yeah. Are the Exchange Contractors
6 ready for their rebuttal case?

7 MR. MINASIAN: Yes. We'd be happy to start.

8 MR. BIRMINGHAM: It should only be a matter of a few
9 minutes. And I know it would be an early recess, but if
10 you prefer I'll just start from memory.

11 C.O. CAFFREY: No, I don't want to handicap you. If
12 you're only talking about five minutes, let's just go off
13 the record for a few minutes. I'm going to stay here and
14 we'll just wait for Ms. Minaberrigarai to come back. And
15 we'll take our appropriate break at the appropriate time.
16 And, perhaps, Mr. Stubchaer can take a few pictures with
17 his really neat camera. We're off the record.

18 (Recess taken from 10:02 a.m. to 10:18 a.m.)

19 C.O. CAFFREY: All right. We're back on the record.

20 Mr. Birmingham, I believe you have some redirect
21 rebuttal, sir.

22 MR. BIRMINGHAM: I do have some redirect. And thank
23 you for giving me an opportunity to gather my --
24 C.O. CAFFREY: And for the record, you were right in
25 the first place, we might as well have made that our break;

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1 it was a sufficient amount of time.

2 C.O. STUBCHAER: But I didn't --

3 C.O. CAFFREY: Mr. Stubchaer complains that he didn't
4 get his coffee.

5 C.O. CAFFREY: Go ahead, Mr. Birmingham. Welcome,
6 sir.

7 ---oOo---

8 REDIRECT REBUTTAL BY WESTLANDS WATER DISTRICT

9 WILLIAM JOHNSTON

10 BY THOMAS BIRMINGHAM

11 MR. BIRMINGHAM: Thank you very much.

12 Mr. Johnston, I've got some preliminary questions,
13 but before I ask them, immediately before the recess Board
14 Member Del Piero was asking you if you could equate the
15 volume of salts produced from the discharge of drainage to
16 some building size. Are you able to do that?

17 MR. JOHNSTON: With the help of my friend K.T. Shum's
18 conversion charts we came up with a size of 111 yards
19 cubed. So 111 by 111 by 100 cubed.

20 MEMBER DEL PIERO: I appreciate that.

21 MR. BIRMINGHAM: We have used the term during --

22 well, we heard the term during your examination "tile
23 water" and "subsurface drainage." Do you recall using
24 those terms or hearing those terms in the examination of
25 you?

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1 MR. JOHNSTON: Yes.

2 MR. BIRMINGHAM: And I believe yesterday during
3 cross-examination you stated that it was important to note
4 that tile water and subsurface drainage are synonymous with
5 one another?

6 MR. JOHNSTON: Yes, as being used as a term for the
7 water that's produced by subsurface drains.

8 MR. BIRMINGHAM: Can you tell us why subsurface
9 drainage water is sometimes referred to as "tile water"?

10 MR. JOHNSTON: Because in the early days most
11 subsurface drainage systems were constructed from clay tile
12 and -- or the original drainage systems were constructed
13 from clay tile. So the name "tile drainage" became common.
14 And then the materials used for constructing subsurface
15 drains evolved into concrete and then into plastics, which
16 is common today to use plastic tubing for subsurface
17 drainage, but it's still commonly called "tile water."

18 MR. BIRMINGHAM: And so in your examination if you
19 use the term "subsurface drainage" or "tile water" you
20 meant the same water?

21 MR. JOHNSTON: Correct.

22 MR. BIRMINGHAM: Mr. Jackson as well as a number of
23 other attorneys asked you questions about the construction
24 of the San Luis Drain. Do you recall those questions?
25 MR. JOHNSTON: Yes.

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1 MR. BIRMINGHAM: And in particular Mr. Jackson asked
2 you the potential benefits of constructing a San Luis
3 Drain. Do you recall that question?

4 MR. JOHNSTON: Yes.

5 MR. BIRMINGHAM: Would you elaborate on the benefits
6 that would result from the construction or the completion
7 of the San Luis Drain?

8 MR. JOHNSTON: Without putting numbers to it, the
9 benefits, of course, is to maintain the continued
10 agricultural productivity of these lands on the west side
11 of the San Joaquin Valley.

12 I think Mr. Brown was getting to this point just
13 before we took our morning break and it's having a drain
14 available to be able to provide drainage service to much of
15 the land on the west side would allow the land to maintain
16 its productivity and also have the option of growing
17 higher-value crops.

18 MR. BIRMINGHAM: Now, I believe you testified in
19 response to questions by Mr. Jackson that as originally
20 authorized by Congress the San Luis Drain was intended to
21 serve the San Luis unit?

22 MR. JOHNSTON: That's correct.

23 MR. BIRMINGHAM: And what water districts are within

24 the San Luis unit?

25 MR. JOHNSTON: Westlands Water District, Panoche

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1 Water District and the San Luis Water District.

2 MR. BIRMINGHAM: Have there been discussions about
3 allowing other districts to utilize the San Luis Drain?

4 MR. JOHNSTON: Yes.

5 MR. BIRMINGHAM: What other districts potentially
6 could use the San Luis Drain if it were completed?

7 MR. JOHNSTON: Without naming each one between
8 Westlands and the Delta, all of the districts on the west
9 side of the San Joaquin River could use the drain.

10 MR. BIRMINGHAM: Now, if the drain were completed and
11 used by water districts on the west side of the San Joaquin
12 Valley, would there be any benefit to the San Joaquin
13 River?

14 MR. JOHNSTON: Certainly.

15 MR. BIRMINGHAM: What would be the benefit to the San
16 Joaquin River if the drain were completed and used by water
17 districts on the west side of the San Joaquin Valley?

18 MR. JOHNSTON: The benefit would be that all the
19 salinity that is getting into the river through subsurface
20 drains, either directly or indirectly, could be placed in
21 the constructed drain and exported from the valley.

22 MR. BIRMINGHAM: So under existing circumstances, and
23 I think we heard testimony about this before, under
24 existing circumstances the San Joaquin River is being used
25 as a means of conveying subsurface drainage out of the

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1 valley?

2 MR. JOHNSTON: That is correct.

3 MR. BIRMINGHAM: And if the San Luis Drain were
4 completed it could replace the San Joaquin River as a means
5 of conveying subsurface drain water out of the San Joaquin
6 Valley?

7 MR. JOHNSTON: That's correct.

8 MR. BIRMINGHAM: And in your opinion would that
9 improve water quality in the San Joaquin River?

10 MR. JOHNSTON: Yes, it would.

11 MR. BIRMINGHAM: Mr. Johnston, Ms. Minaberrigarai is
12 placing on the overhead Westlands Water District's Exhibit
13 97. You were asked a number of questions about Westlands
14 Water District's Exhibit 97 on cross-examination by various
15 attorneys.

16 I would like to review with you once again
17 Westlands Water District's Exhibit Number 97. You
18 indicated in response to questions by other attorneys that
19 the red arrows represent the directions of groundwater
20 lateral movement if there were such movement; is that
21 correct?

22 MR. JOHNSTON: Yes.

23 MR. BIRMINGHAM: Essentially, the arrows show that

24 the groundwater would move perpendicular to the groundwater

25 contours if there were lateral movement?

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1 MR. JOHNSTON: That's correct.

2 MR. BIRMINGHAM: Now, we said and you said repeatedly
3 if there were lateral movement, why did you say in response
4 to questions "if there were lateral movement"?

5 MR. JOHNSTON: Because I have made no determination
6 as to whether or not there is lateral movement on the
7 majority of the area represented by these arrows. And
8 knowing the types of soils that lay in the valley, there
9 would have to be some examination of that issue in order to
10 determine if and where there's any lateral movement
11 occurring.

12 MR. BIRMINGHAM: So the red arrows do not represent
13 any volume of groundwater movement?

14 MR. JOHNSTON: As placed on this map, that's correct.

15 MR. BIRMINGHAM: And I believe it was your testimony
16 that in many of the areas depicted on Westlands's Exhibit
17 97 the predominant direction of groundwater movement is
18 vertically as opposed to laterally?

19 MR. JOHNSTON: That's correct. As shown on
20 Westlands's 96, or whatever it is.

21 MR. BIRMINGHAM: On Westlands Water District's

22 Exhibit 96?

23 MR. JOHNSTON: Yes. Ms. Minaberrigarai is putting up

24 Westlands Water District's Exhibit 96, and is this the

25 exhibit to which you were referring, Mr. Johnston, in

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1 response to my last question?

2 MR. JOHNSTON: Yes. Yes, it is.

3 MR. BIRMINGHAM: And you indicated that this exhibit
4 indicates, or shows that the predominant direction of
5 groundwater movement is vertical?

6 MR. JOHNSTON: Yes.

7 MR. BIRMINGHAM: Now, in response to a number of
8 questions you stated that it's important with respect to
9 Westlands' Exhibit Number 96 to recognize the difference in
10 scales between the horizontal and vertical axis?

11 MR. JOHNSTON: Yes.

12 MR. BIRMINGHAM: Why is that?

13 MR. JOHNSTON: Well, because the difference in scale
14 distorts the actual -- the physical depiction as shown on
15 this page. In other words, the vertical scale is only 1200
16 feet. Whereas the scale, the horizontal, or what's
17 depicted on this figure is 1200 feet in terms of the
18 vertical scale, or vertical depiction. And it's like 20 to
19 30 miles on the horizontal direction. So if you put them
20 on the same scale you couldn't get them on the same page.

21 MR. BIRMINGHAM: Now, Westlands Water District's

22 Exhibit 96 as you testified depicts the location of a
23 groundwater divide?

24 MR. JOHNSTON: Yes.

25 MR. BIRMINGHAM: I'd like to ask you some questions

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1 about the data which are depicted on Westlands' Exhibit 96.
2 The data which were used to develop Westlands Water
3 District's Exhibit 96 were data taken from reports prepared
4 by the USGS and the Department of Water Resources?

5 MR. JOHNSTON: That's correct.

6 MR. BIRMINGHAM: And they are not data that you
7 collected personally?

8 MR. JOHNSTON: No, they are not.

9 MR. BIRMINGHAM: I'd like to put up Westlands Water
10 District's Exhibit 13. Westlands Water District's Exhibit
11 13 you testified about previously and were asked questions
12 about during cross-examination in this phase of these
13 proceedings. Westlands Water District's Exhibit 13 also
14 depicts the location of a groundwater divide; is that
15 correct?

16 MR. JOHNSTON: Yes, it is.

17 MR. BIRMINGHAM: Now, comparing Westlands Water
18 District's Exhibit 13 and the location of the groundwater
19 divide on that exhibit and the location of the groundwater
20 divide on Westlands' Exhibit 97, are they generally on the
21 2 exhibits in the same area?

22 MR. JOHNSTON: Yes, I believe they are.
23 MR. BIRMINGHAM: Now --
24 MR. JOHNSTON: On Westlands' Exhibit 96 was taken
25 from the USGS report from which this figure is taken.

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1 MR. BIRMINGHAM: You were asked a number of questions
2 about the potential for movement of the groundwater divide.

3 Do you recall those questions?

4 MR. JOHNSTON: Yes, I do.

5 MR. BIRMINGHAM: Do you have an opinion on the
6 accuracy of the location of the groundwater divide as it's
7 depicted on Westlands Water District's Exhibit 13 and
8 Westlands Water District's Exhibit 96?

9 MR. JOHNSTON: Well, I believe that the USGS is very
10 careful on how they report their findings. And so I would
11 not question that the location of this line is not
12 accurate. So that's the best I can say about it is that I
13 rely on the USGS reports as being correct.

14 MR. BIRMINGHAM: Now, Mr. Minasian asked you a series
15 of questions yesterday about the time when the data on
16 which these exhibits are based were collected. And in
17 response to those questions you indicated that they were
18 collected sometime in the -- the data was collected
19 sometime in the early to mid '80s; is that correct?

20 MR. JOHNSTON: I think that was the dates that he
21 indicated. The reports were written in 1987 to 1988.

22 MR. BIRMINGHAM: Now, in talking about the location
23 of the groundwater divide today, do you have an opinion as
24 to the accuracy of Westlands Water District Exhibits 13 and
25 96?

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1 MR. JOHNSTON: I would think that the groundwater
2 divide would be quite close to the location that's shown on
3 those two exhibits today.

4 MR. BIRMINGHAM: And on what do you base that
5 opinion?

6 MR. JOHNSTON: On the fact that there has not been a
7 substantial change in the water table in that area in the
8 last ten years.

9 MR. BIRMINGHAM: At the conclusion of his
10 cross-examination of you last Wednesday, a week ago,
11 Mr. Jackson asked you if you agreed with the conclusions
12 contained in the Rainbow Report, which I believe is in
13 evidence as State Water Resources Control Board Staff
14 Exhibit 147.

15 Do you recall him asking you that question?

16 MR. JOHNSTON: Yes, I do.

17 MR. BIRMINGHAM: And I believe it was your testimony
18 that you disagree with the conclusions of the Rainbow
19 Report. And you were going to review the report and follow
20 up with him when we resumed yesterday; is that correct?

21 MR. JOHNSTON: Yes. And yesterday morning I expanded

22 on my comment that I disagreed and said that there are
23 certain conclusions and recommendations in the report that
24 are probably fine, some that would not have any impact on
25 the drainage situation and others that I disagree with.

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1 MR. BIRMINGHAM: Can you identify specifically those
2 conclusions in the Rainbow Report with which you disagree,
3 and the Rainbow Report, again, is Staff Exhibit 147?

4 MR. JOHNSTON: The Rainbow Report has a chapter one
5 entitled "Summary of the Plan and Recommendations for
6 Action." They break the recommendations down into several
7 categories. And then they discuss each of those for each
8 subarea of the valley under the section entitled,
9 "Conclusions and Recommendations for Action."

10 In looking at the summary of the plan they talk
11 about source control consisting mainly of farm improvements
12 and application of water to reduce the source of
13 repercolation. In regards to Westlands, specifically, they
14 indicate that there should be a reduction of .35 acre-feet
15 per acre in the application of water to reduce the leaching
16 fraction, or the amount of water that passes through the
17 root zone by that amount.

18 I think that that is an erroneous assumption that
19 that amount of water is already percolating through the
20 root zone, because the water supply in Westlands does not
21 allow that much water to be lost to the groundwater.

22 MEMBER BROWN: Mr. Chairman?

23 C.O. CAFFREY: Excuse me, Mr. Birmingham, Mr. Brown

24 has a question.

25 MEMBER BROWN: What does that .35 per acre-feet per

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1 acre come from? I know it came out of the report, but what
2 did they use --

3 MR. JOHNSTON: I have not been able to find out,
4 because I argued with them when they were putting that
5 number in the report that it wasn't inappropriate. And it
6 stayed in the report.

7 MEMBER BROWN: Was it something that they just pulled
8 out of the air, or was there calculations for that?

9 MR. JOHNSTON: I think you're going to have to find
10 that out.

11 MEMBER BROWN: You can't tell from the report?

12 MR. JOHNSTON: No, I can't.

13 MEMBER BROWN: Thank you, Mr. Chairman.

14 MEMBER DEL PIERO: Mr. Chairman?

15 C.O. CAFFREY: Mr. Del Piero.

16 MEMBER DEL PIERO: Who incorporated the number?
17 Mr. Brown is interested in knowing, so who do we go to to
18 find out the answer?

19 MR. JOHNSTON: Well, Ed Enhaup (phonetic) was the
20 program manager and there were about 50 people that worked
21 on the report.

- 22 MEMBER DEL PIERO: You don't know?
- 23 MR. JOHNSTON: I do not know.
- 24 MR. BIRMINGHAM: Exhibit 147, State Board Staff
- 25 Exhibit 147 is a report of the Bureau of Reclamation?

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1 MR. JOHNSTON: That's correct. It was a Department
2 of Interior report with the California Resources Agency,
3 the Bureau and the Fish and Wildlife Service and geological
4 survey worked on it under the Department of Interior. And
5 the Department of Fish and Game and Department of Water
6 Resources worked on it under the California Resources
7 Agency.

8 MR. BIRMINGHAM: But from the report you can't
9 determine where they obtained the .35 acre-feet per acre?

10 MR. JOHNSTON: You mean how they determined whether
11 that -- no, it does not explain. There are a number of
12 technical appendices that go with this. And it's possible
13 that there's some explanation in the appendices that I have
14 not reviewed.

15 MEMBER BROWN: Mr. Chairman?

16 C.O. CAFFREY: Mr. Brown has another question. Go
17 ahead, Mr. Brown.

18 MEMBER BROWN: Generally, with figures it's kind of
19 important they'll footnote them as the source in those, the
20 engineering reports, but this evidently is not a footnote?

21 MR. JOHNSTON: I haven't found that footnote if it's

22 here.

23 MEMBER BROWN: Thank you.

24 MR. BIRMINGHAM: Now, yesterday, Mr. Johnston, we'll

25 get back to the Rainbow Report in a few moments, but

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1 yesterday in response to a question I believe you testified
2 that the fact that Westlands has an insufficient water
3 supply helps the drainage problem within Westlands.

4 Do you recall testifying to that effect?

5 MR. JOHNSTON: Yes, I do.

6 MR. BIRMINGHAM: Could you, please, explain further
7 why the fact that Westlands has an insufficient water
8 supply helps the drainage problem in Westlands.

9 MR. JOHNSTON: Because the farmers are only allocated
10 a supply of water that is close to the consumptive needs of
11 the crops that they're growing prevents the application of
12 excess water, which would build up the water table.
13 Therefore, the fact that they're limited on their water
14 supply reduces the potential for increasing the drainage
15 problem more rapidly than it will otherwise develop.

16 MR. BIRMINGHAM: Okay. On average, how much water is
17 applied, assuming that Westlands receives a full-contract
18 supply from the Bureau of Reclamation, on average how much
19 water would be applied per acre within Westlands?

20 MR. JOHNSTON: The maximum that would be applied I
21 believe is somewhere around 2.7 acre-feet per acre, if I

22 recall correctly.

23 MR. BIRMINGHAM: And generally, what is the

24 evapotranspiration rate of the crops that are grown within

25 Westlands?

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1 MR. JOHNSTON: They're somewhere between 2 and a half
2 and 3 acre-feet per acre.

3 MR. BIRMINGHAM: Now --

4 MEMBER BROWN: Mr. Chairman?

5 C.O. CAFFREY: Yes, Mr. Brown.

6 MEMBER BROWN: Point of clarification, on the west
7 side you said the average consumptive use of those crops is
8 about 2.7?

9 MR. JOHNSTON: I said between 2 and a half and 3, I
10 think. You get crops like onions that have, you know, like
11 a 1.2 acre-foot per acre and you get alfalfa and rice that
12 go to 4 and 5 feet. So the average is --

13 MEMBER BROWN: And what would you estimate the
14 overall irrigation efficiency to be?

15 MR. JOHNSTON: In Westlands greater than 80 percent.

16 MEMBER BROWN: So if there's 80 percent, then the
17 applied water would have to be about 1.2 times the 2.7,
18 about 3 and a half to 4, 3.6?

19 MR. JOHNSTON: Well, they don't have three and a half
20 to 4 feet to apply.

21 MEMBER BROWN: This is the point I'm working up:

22 Where does the extra water come from, from the groundwater
23 basin?
24 MR. JOHNSTON: There is pumping that takes place. In
25 the 2.7 to 2.8 acre-feet per acre that counts -- that

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1 includes, I should say, some groundwater pumping, because
2 the contract supply is 1.1 million acre-feet.

3 MEMBER BROWN: That's about 2.1 acre-feet per acre
4 per year. So the difference is made up by groundwater
5 pumping?

6 MR. JOHNSTON: That's correct.

7 MEMBER BROWN: And does the district keep figures on
8 what the groundwater extraction is, annually?

9 MR. JOHNSTON: They make estimates.

10 MEMBER BROWN: There is no meters or anything, so you
11 really don't know?

12 MR. JOHNSTON: Don't know. But based on what crops
13 are grown and the District in the past has obtained PG&E
14 power records to estimate groundwater pumping.

15 MEMBER BROWN: And you just estimate an efficiency
16 for the pumps and the power units?

17 MR. JOHNSTON: That's correct.

18 MEMBER BROWN: And then from that you get a total
19 extraction and then you add that to your CVP water for a
20 total quantity of supply?

21 MR. JOHNSTON: Right. And then, of course, in the

22 past since the contract supply has been reduced by the CVP,
23 the district has obtained water from other districts by
24 transfer --
25 MEMBER BROWN: Were you able to --

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1 MR. JOHNSTON: -- to make up some of the deficit.

2 MEMBER BROWN: Excuse me, Mr. Johnston, for asking a
3 question before you were finished. Westlands acquired the
4 meter readings from PG&E for all of the growers, or --

5 MR. JOHNSTON: PG&E will furnish the groundwater
6 pumping records. And I'm talking --

7 MEMBER BROWN: Power?

8 MR. JOHNSTON: -- ten years ago. I don't know if
9 they changed their policy, but they used to furnish the
10 power records by township so that the District could not
11 identify specific owners or specific wells. So the
12 calculation was fairly broad. But it was -- you could
13 determine how much groundwater was pumped by township.

14 MEMBER BROWN: That's the point I was working to.
15 Your comfort level of the liability of those PG&E figures
16 in order to arrive at the applied water rate of 2.7.

17 MR. JOHNSTON: Well, I'm looking at the total water
18 application of about 1.4 to 1.5 million acre-feet on
19 544,000 acres of irrigated land.

20 MEMBER BROWN: Right. I understand.

21 MR. JOHNSTON: That's averages now.

22 MEMBER BROWN: So you're talking averages?

23 MR. JOHNSTON: These are all averages. A particular

24 grower would then have a block of water that he would be

25 allocated for his land. If someone had a thousand acres

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1 they would be allocated 2.5 from the District. And if he
2 didn't have a groundwater well, he wouldn't have any other
3 supply.

4 So he would have to take that block of water and
5 apply it to his land and his crops as he saw fit. He may
6 only irrigate, say, 800 acres this year and take that block
7 of water and use it on that, but when you're dealing with
8 544,000 acres it's really --

9 MEMBER BROWN: Sure, I understand.

10 MR. JOHNSTON: It's really difficult to get down to
11 the last acre.

12 MEMBER BROWN: Thank you, Mr. Birmingham, and thank
13 you, Mr. Chairman.

14 C.O. CAFFREY: You're welcome, Mr. Brown.

15 MR. BIRMINGHAM: The analysis that you just described
16 in response to my questions and Board Member Brown's
17 questions are the conclusions that you've expressed born
18 out by any of the data which have been collected as part of
19 District's Soils Monitoring Program?

20 MR. JOHNSTON: Yes.

21 MR. BIRMINGHAM: What are those data?

22 MR. JOHNSTON: Well, the data that we explained to
23 the Board through our exhibits show that there is a limited
24 leaching taking place in the soils that were analyzed and
25 that there are limits to what crops can be grown on these

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1 soils with a high water table.

2 MR. BIRMINGHAM: Now, a number of attorneys have --
3 actually, it was predominantly Mr. Jackson and
4 Mr. Nomellini have asked you about the potential
5 consequences of taking CVP water supply away from Westlands
6 Water District.

7 First, let's talk about the 42,000 acres which was
8 previously served by the subsurface collector drainage
9 system. Let's assume, hypothetically, Mr. Johnston, that
10 the CVP water supply that has been provided to those lands
11 was no longer provided. Would that necessarily mean that
12 Westlands would not have a need for its entire existing CVP
13 supply?

14 MR. JOHNSTON: No, it would not.

15 MR. BIRMINGHAM: Why not?

16 MR. JOHNSTON: Because that water could then be used
17 on other lands in the district that now rely in part on
18 groundwater pumping. And particularly in years when the
19 district receives less than its contract supply, it would
20 be needed in the remaining part of the district.

21 MR. BIRMINGHAM: Now, I believe just a few moments

22 ago you testified that even when the district receives a
23 full CVP contract supply that the supply is inadequate for
24 the entire demand within the district?

25 MR. JOHNSTON: That's correct.

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1 MR. BIRMINGHAM: So if water were taken off the
2 42,000 acres previously served by the subsurface drainage
3 system, that water could be put to beneficial use in other
4 areas of the District?

5 MR. JOHNSTON: Yes, it could.

6 MEMBER BROWN: Mr. Chairman?

7 C.O. CAFFREY: Yes, Mr. Brown.

8 MEMBER BROWN: Excuse me, Mr. Birmingham.

9 MR. BIRMINGHAM: Please, go ahead.

10 MEMBER BROWN: Water conserved through fallowing of
11 land and diverted to other lands within the same service
12 area, how does that reduce the percolation requirements in
13 leaching of salts and aid in the problem or aid in
14 resolving the problem?

15 MR. JOHNSTON: In Westlands the shifting of water
16 from one piece of land to another piece of land probably
17 does not do that.

18 MEMBER BROWN: So the value of the land fallowing in
19 this case is what?

20 MR. JOHNSTON: Zero in terms of the salt balance.

21 MEMBER BROWN: Thank you, Mr. Chairman.

22 C.O. CAFFREY: You're welcome, sir.

23 MR. BIRMINGHAM: But you heard, Mr. Johnston, other

24 people advocate, people other than at Westlands Water

25 District advocate that water should be taken away from

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1 Westlands because it's being applied on lands with drainage
2 problems?

3 MR. JOHNSTON: I've heard that, yes.

4 MR. BIRMINGHAM: But simply retiring land within
5 Westlands doesn't necessarily result in water being made
6 available for uses outside of Westlands?

7 MR. JOHNSTON: That's correct.

8 MR. BIRMINGHAM: Now, you were asked a number of
9 questions by Mr. Nomellini about the settlement agreement
10 between the United States Department of the Interior and
11 Westlands Water District, Westlands' Exhibit 95. Do you
12 recall those questions?

13 MR. JOHNSTON: Yes.

14 MR. BIRMINGHAM: The settlement agreement between the
15 United States Department of the Interior and Westlands
16 Water District, Westlands Exhibit 95, has a land retirement
17 component in it; is that correct, Mr. Johnston?

18 MR. JOHNSTON: Yes, it does.

19 MR. BIRMINGHAM: The land retirement -- let me ask
20 the question differently.

21 Why is there a land retirement component within

22 the settlement agreement between the United States
23 Department of Interior and Westlands Water District,
24 Westlands Exhibit 95?
25 MR. JOHNSTON: Because the District was trying to

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1 settle litigation between landowners and the District. And
2 the District, in one of the goals, was to buy the land of
3 those plaintiffs to resolve that litigation.

4 MR. BIRMINGHAM: So, in other words, a number of
5 landowners within the District sued the District?

6 MR. JOHNSTON: Yes.

7 MR. BIRMINGHAM: Did those same landowners sue the
8 United States?

9 MR. JOHNSTON: Yes.

10 MR. BIRMINGHAM: And what was the basis of their
11 claim against the District and the United States?

12 MR. JOHNSTON: The drainage service had been
13 discontinued on their land.

14 MR. BIRMINGHAM: And as a result of the
15 discontinuance of that drainage system their lands had been
16 damaged?

17 MR. JOHNSTON: Yes.

18 MR. BIRMINGHAM: And as a means of trying to settle
19 those claims against the District and the United States,
20 the District and the United States agreed that they would
21 offer to acquire those lands?

22 MR. JOHNSTON: That's correct.

23 MR. BIRMINGHAM: And I believe you testified that the

24 ultimate disposition of those lands which would be required

25 would be to make them part of a wildlife refuge?

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1 MR. JOHNSTON: Yes, I did.

2 MR. BIRMINGHAM: Now, with respect to the lands that
3 were going to be retired, what is your understanding about
4 what would happen to the water appurtenant to the lands to
5 be retired under the settlement agreement, Exhibit 95?

6 MR. JOHNSTON: The water would be retained by
7 Westlands Water District for use in the District elsewhere.

8 MR. BIRMINGHAM: Now, there is a map which is
9 attached to Westlands' Exhibit 95 as Exhibit A. Is that
10 correct?

11 MR. JOHNSTON: That's correct.

12 MR. BIRMINGHAM: And I believe in response to a
13 question by Mr. Nomellini you stated that the crosshatched
14 area on Exhibit A to Westlands' Exhibit 95 is the area in
15 which the United States has historically stated would
16 require drainage?

17 MR. JOHNSTON: That would be the ultimate drainage
18 service area as projected in the contract between the
19 District and the United States.

20 MR. BIRMINGHAM: Now, have you done any kind of an
21 analysis to determine whether the entire area depicted by

22 the crosshatched sections on Exhibit A to Westlands' 95
23 would actually require drainage service?
24 MR. JOHNSTON: Yes.
25 MR. BIRMINGHAM: And is any portion of that analysis

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1 contained in any of the exhibits which have been the
2 subject of your testimony?

3 MR. JOHNSTON: Yes, it is. Exhibit Westlands' 27
4 contains the summary of the analysis that we did to
5 determine what we now believe would be the ultimate area
6 that would need drainage.

7 MR. BIRMINGHAM: And is there a figure behind tab one
8 to Westlands' Exhibits 27 which depicts the area which in
9 your opinion will actually require drainage?

10 MR. JOHNSTON: Yes.

11 MR. BIRMINGHAM: What is that figure?

12 MR. JOHNSTON: It's Figure 4 behind tab one in
13 Westlands' Exhibit 27.

14 MR. BIRMINGHAM: And you have depicted with a cross
15 on Figure 4 of Westlands' Exhibits 27 there is an area
16 within the District boundaries which you have identified
17 through crosshatching; is that correct?

18 MR. JOHNSTON: Yes.

19 MR. BIRMINGHAM: And you've identified that as the
20 area with shallow groundwater depth of less than 5 feet
21 during April 1993 EC of shallow groundwater soils, soiled

22 lands forms designated by -- I'm sorry, I skipped a line.

23 Would you, please, tell us what's represented by

24 the crosshatched area on Figure 4 of Westlands' Exhibit 27.

25 MR. JOHNSTON: Yes. The crosshatched area represents

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1 an area with shallow groundwater depth of less than 5 feet
2 during April '93, an EC of the shallow groundwater greater
3 than 12 deciSiemens per meter, or soil land forms
4 designated by the USDA Soil Conservation Service as poor
5 natural drainage, or land with excess salinity. It's an
6 area approximately 198,300 acres in size.

7 Whereas the map on the Exhibit A, the crosshatched
8 area on Exhibit A covers an area of about 300,000 acres.
9 So the area we contemplate will ultimately need drainage
10 now based on the analysis we did is about 100,000 acres
11 smaller than the original area.

12 MR. BIRMINGHAM: Okay. Now, going back to the
13 settlement agreement between the United States Department
14 of the Interior and Westlands Water District, was this
15 settlement agreement a plan to deal with the drainage
16 problem in Westlands Water District?

17 MR. JOHNSTON: No.

18 MR. BIRMINGHAM: It was a plan to try and resolve
19 litigation between landowners in the district on the one
20 hand and the District and the United States on the other?

21 MR. JOHNSTON: That's correct.

22 MR. BIRMINGHAM: Now, the lands that were held by the
23 plaintiffs in the litigation which we've been talking
24 about, were those lands within the 42,000 acres previously
25 served by the subsurface collector drainage system?

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1 MR. JOHNSTON: The majority of the lands owned by the
2 plaintiffs was in that area.

3 MR. BIRMINGHAM: Mr. Nomellini also asked you a
4 series of questions about the sources of salinity in the
5 San Joaquin River. Do you recall him asking you that
6 question?

7 MR. JOHNSTON: Yes.

8 MR. BIRMINGHAM: And in response to his question you
9 identified subsurface drainage water discharged to the
10 river?

11 MR. JOHNSTON: As one of the sources, yes.

12 MR. BIRMINGHAM: What are some of the other sources
13 of salinity in the San Joaquin River?

14 MR. JOHNSTON: I think we also -- someone else asked
15 me that same question. And I said that the other sources
16 would be surface runoff from irrigated land, flood flows,
17 subsurface accretions, flow from the east side tributaries,
18 M&I discharges into the river, that should cover most of
19 it.

20 MR. BIRMINGHAM: Now, have you done any kind of
21 analysis to determine or quantify the proportion of

22 salinity in the San Joaquin River that comes from any one
23 of the sources that you have just identified?
24 MR. JOHNSTON: Only that I've reviewed the Regional
25 Water Quality Control Board reports that estimate that

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1 about one third of the salinity in the river comes from
2 irrigated agricultural subsurface drainage.

3 MR. BIRMINGHAM: Now, we had testimony from some of
4 the engineers from the Regional Water Quality Control Board
5 in this proceeding. Were you present during that
6 testimony?

7 MR. JOHNSTON: Yes, I was.

8 MR. BIRMINGHAM: And the testimony that was presented
9 by those engineers included some estimates of the
10 quantifications of the proportions of salinity from each
11 one of these sources that you've identified; is that
12 correct?

13 MR. JOHNSTON: I believe that they did cover that,
14 yes.

15 MR. BIRMINGHAM: My basic question, Mr. Johnston, is:
16 You would have no reason to agree or disagree with the
17 statements made by those engineers with respect to the
18 amounts from each one of these sources for salinity in the
19 San Joaquin River?

20 MR. JOHNSTON: No, I would not.

21 MR. BIRMINGHAM: Mr. Nomellini asked you about the

22 potential of salinity making its way into the San Joaquin
23 River from Westlands Water District as a result of flood
24 flows into the San Joaquin River. Do you recall that
25 question?

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1 MR. JOHNSTON: Yes.

2 MR. BIRMINGHAM: Mr. Johnston, generally, when there
3 are flood flows sufficient enough to make their way from
4 Westlands Water District into the San Joaquin River via
5 sheet flows or via the Fresno Slough, are salinity
6 standards at Vernalis a problem?

7 MR. JOHNSTON: Salinity standards at Vernalis -- or
8 meeting the salinity standards at Vernalis are generally
9 not a problem during flood periods.

10 MR. BIRMINGHAM: And why is that?

11 MR. JOHNSTON: Because there's so much water flowing
12 down the river that the dilution of any salts that enter
13 the river meet the salinity objectives.

14 MR. BIRMINGHAM: You were asked a number of questions
15 by Members of the Board concerning the repayment capacity
16 of lands within Westlands to pay for the construction of a
17 drain. Do you recall those questions?

18 MR. JOHNSTON: I'm not sure they were directed
19 specifically at the drain, but I recall those questions,
20 yes.

21 MR. BIRMINGHAM: Well, excuse me, I came in during

22 the middle of that examination, but you were asked a number
23 of questions about repayment capacity?

24 MR. JOHNSTON: Yes, most of which I didn't answer.

25 MR. BIRMINGHAM: Why didn't you answer those

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1 questions?

2 MR. JOHNSTON: Because I didn't have the answers.

3 MR. BIRMINGHAM: You are not an expert agricultural
4 economist; is that correct?

5 MR. JOHNSTON: That's correct.

6 MR. BIRMINGHAM: And if you were going to calculate
7 repayment capacities, you would defer to individuals who
8 are experts at calculating the repayment capacity of lands
9 within an irrigation district?

10 MR. JOHNSTON: Yes.

11 MR. BIRMINGHAM: Specifically with respect to the
12 repayment capacity of lands within Westlands to pay for the
13 construction of the drain, has that been an issue of some
14 controversy in recent history?

15 MR. JOHNSTON: Yes, it has.

16 MR. BIRMINGHAM: Was the repayment capacity of lands
17 to pay for the construction of the drain an issue that was
18 raised by the United States in connection with the first
19 phase of trial in the Sumner Peck case?

20 MR. JOHNSTON: Yes, it was.

21 MR. BIRMINGHAM: Now, Sumner Peck versus the United

22 States was the litigation which you referred to a few
23 moments ago brought by landowners against the District and
24 the United States?
25 MR. JOHNSTON: That's correct.

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1 MR. BIRMINGHAM: And during the preparation for the
2 first phase of the trial in that proceeding, did the United
3 States assert as a defense the construction of the San Luis
4 Drain had been excused because lands within Westlands did
5 not have the capacity to pay for the construction of that
6 drain?

7 MR. JOHNSTON: Yes, the United States made that
8 assertion.

9 MR. BIRMINGHAM: And during the preparation for that
10 trial, did the United States withdraw that assertion?

11 MR. JOHNSTON: I believe they did.

12 MR. BIRMINGHAM: And there was evidence presented
13 during the first phase of the trial between the United
14 States and Westlands concerning the failure of the United
15 States to complete the drain concerning the repayment
16 capacity of lands within the District; is that correct?

17 MR. JOHNSTON: Yes.

18 MR. BIRMINGHAM: Who presented that evidence on
19 behalf of the District?

20 MR. JOHNSTON: Dave Worth (phonetic) presented most
21 of it.

22 MR. BIRMINGHAM: Mr. Worth at that time, what was his
23 capacity?
24 MR. JOHNSTON: He was the chief financial officer for
25 Westlands Water District.

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1 MR. BIRMINGHAM: And what is his current capacity of
2 the District?

3 MR. JOHNSTON: He is now manager of the District.

4 C.O. CAFFREY: Excuse me, Mr. Birmingham, Mr. Brown
5 has a question.

6 MR. BIRMINGHAM: Yes.

7 MEMBER BROWN: This is important, Mr. Birmingham, you
8 were out of the room and, therefore, I'll repeat the
9 question or the tentative question for your benefit.

10 The payment capacity potential question that I
11 asked was with regards to the potential loss revenue of
12 these lands to the State of California, the agricultural
13 production, had the lands been developed to their full
14 capability.

15 The lands being limited, as you have so testified
16 due to the groundwater table and due to the calcium
17 carbonates and other things that are typical to leach out
18 at those times, there is a potential for these lands, as he
19 testified to, for these lands to have high value payment
20 capacity for crops. And those high value crops, obviously,
21 the funds could be applied towards any source of demands or

22 needs. The question was asked with the intent of the
23 potential loss of revenue to the State of California to
24 agricultural economy.

25 MR. BIRMINGHAM: Thank you for that clarification,

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1 Board Member Brown.

2 The lands within the District would have a greater
3 payment capacity, greater potential to produce revenue if
4 they were provided drainage?

5 MR. JOHNSTON: Yes, they would.

6 MR. BIRMINGHAM: And was there any determination made
7 with respect to the ability of the lands within Westlands
8 to pay for a drain?

9 MR. JOHNSTON: Yes. The District testified before
10 Judge Wanger that there was -- there is repayment capacity
11 to construct the drain as proposed in Westlands' proposal
12 to the Court.

13 MR. BIRMINGHAM: And did the District Court make a
14 determination on that issue?

15 MR. JOHNSTON: Yes. The District court agreed with
16 the District that such repayment capacity was available.

17 MR. BIRMINGHAM: I have no further questions.

18 C.O. CAFFREY: All right. Thank you, Mr. Birmingham.

19 I'm sorry, Mr. Del Piero, you have --

20 MEMBER DEL PIERO: There was a --

21 C.O. CAFFREY: I was going to go to the parties for

22 cross-examination.

23 MEMBER DEL PIERO: Do you mind if I ask him two
24 questions in regards to what Mr. Birmingham just asked him?

25 C.O. CAFFREY: Clarifying questions?

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1 MEMBER DEL PIERO: Yes.

2 C.O. CAFFREY: Go ahead, Mr. Del Piero.

3 MEMBER DEL PIERO: When the Court made a
4 determination as to the payment capacity of Westlands, did
5 that include just the capital costs, or did that include
6 the ongoing O&M of the drain in the event that the
7 treatment requirement was necessary?

8 MR. JOHNSTON: It included the O&M for the treatment
9 as proposed by Westlands.

10 MEMBER DEL PIERO: And what was that?

11 MR. JOHNSTON: That was the biological selenium
12 treatment.

13 MEMBER DEL PIERO: So it did not deal with
14 desalinization?

15 MR. JOHNSTON: It did not deal with desalinization.

16 MEMBER DEL PIERO: Okay. Three short questions. You
17 know, I will tell you I've been here --

18 C.O. CAFFREY: It might be three, but I don't know
19 about the short.

20 MEMBER DEL PIERO: It will be seven years next month
21 that I've been here. And all hope is now lost, because I'm

22 going to ask you these three questions and I had to make
23 sure that I was doing this correctly with both Mr. Brown
24 and Mr. Stubchaer before I did this, because it has to do
25 with numbers and multiplication. Hold on a second.

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1 You indicated that in the Westlands' report that
2 the estimated maximum -- you need to grab a pen. All
3 right. You indicated in the Westlands' report that was
4 approved by the Court, 60 million gallons a day was the
5 maximum discharge potential from the drain. Is that
6 correct?

7 MR. JOHNSTON: Yes.

8 MEMBER DEL PIERO: Okay. Mr. Stubchaer advises me I
9 have no independent corroboration of this, that that works
10 out to somewhere around 65,700 acre-feet a year more or
11 less?

12 MR. JOHNSTON: Uh-huh.

13 MEMBER DEL PIERO: Okay. No calculator. I know for
14 a fact that desalinization costs on the coast including
15 brine disposal run at \$2,000 an acre-foot. And that's a
16 fat number. Normally, a drain runs 1700, \$1780 an
17 acre-foot. Let's assume for the sake of zeros, it's \$2,000
18 an acre-foot and that includes a tag of disposal of brine
19 cost.

20 Let's assume, this is a hypothetical so that we
21 don't have a problem having something to substantiate that

22 in the evidentiary record, by my calculation that works out
23 to an annual gross cost in the event that you were to run
24 the entire production of the drain through a
25 reverse-osmosis system at \$131,400,000 a year.

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1 Does that sound about right to you?

2 MR. JOHNSTON: If your math is correct, yeah.

3 MEMBER DEL PIERO: Okay. You indicated during your
4 previous testimony that there's approximately 600,000
5 acre-feet -- pardon me, 600,000 acres within Westlands?

6 MR. JOHNSTON: Yes.

7 MEMBER DEL PIERO: If you divide \$131,400,000 by
8 600,000 acre-feet -- acres, 600,000 acres, forgive me, it
9 works out to \$209 per acre of land which would be the
10 assessment for an annualized R&O system to be operated, it
11 doesn't include capital costs, that would be ongoing
12 operational cost.

13 MR. JOHNSTON: Per year?

14 MEMBER DEL PIERO: Per year, \$209 per acre per year
15 to take care of the environmental problem that's produced
16 by the irrigation of the 600,000 acres. Now, I have a
17 question for you:

18 Given the questions that Mr. Brown asked you in
19 regard to increased productivity in the event that drainage
20 is, in fact, made available, will that increased
21 productivity in your mind -- and obviously you can't give

22 me an exact answer per crop, so I'm asking for a gross
23 answer as to agricultural, in general -- would that
24 increased productivity cover the cost of remediating the
25 environmental problem created by the drain?

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1 MR. JOHNSTON: One comment first, and that is that
2 desalinization doesn't deal with the selenium.

3 MEMBER DEL PIERO: I understand that. But \$2,000 an
4 acre-foot does, that's why I made the number fat.

5 MR. JOHNSTON: So you're saying we've got extra
6 money --

7 MEMBER DEL PIERO: \$2,000 an acre-foot will take care
8 of desalting as well as the biological selenium removal
9 that you indicated was going to run around \$750.

10 MR. JOHNSTON: If this was the only cost, it would
11 probably be pretty close. Assuming everybody could
12 produce -- you know, eventually produce crops that would
13 cover that. Certainly, it takes some time to reclaim the
14 soil and install the drains. Those costs are not included.
15 The construction of the drainage system is not included.

16 MEMBER DEL PIERO: Nobody is talking about this
17 project taking place overnight.

18 MR. JOHNSTON: That's true.

19 MEMBER DEL PIERO: The capitalized cost on the
20 facility itself would be 30 years.

21 MR. JOHNSTON: You'd probably have to double this

22 cost at least to get the whole project together.
23 MEMBER DEL PIERO: I don't doubt that the capital
24 costs are going to be significantly greater. I'm talking
25 about ongoing O&M only. Does it sound about right, do you

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1 think?

2 MR. JOHNSTON: I don't know off the top of my head
3 whether it would be or not. I think we need to study this
4 a little bit.

5 MEMBER DEL PIERO: Okay.

6 MR. BIRMINGHAM: Let me ask you, Mr. Johnston, the
7 purpose of the plan that Westlands has been developing with
8 the Bureau of Reclamation under the MOU that the Board
9 directed be developed for purposes of studying the drain
10 would look at the kind of issue that Mr. Del Piero has just
11 identified; is that correct?

12 MR. JOHNSTON: Sure, yes, it would.

13 MR. BIRMINGHAM: And assuming hypothetically as Board
14 Member Del Piero has that it would be necessary to treat
15 the water, desalt the water with desalinization in order to
16 remediate what Mr. Del Piero referred to as environmental
17 problems, if you treated the water to that extent is there
18 the potential that the water would be marketable for some
19 use?

20 MR. JOHNSTON: Certainly, some of it would be, yes.
21 I mean a large percentage of it would be reusable.

22 MR. BIRMINGHAM: Could the revenue produced as a
23 result of the sale of that water which was reusable be used
24 to offset some of the operation and maintenance costs
25 incurred to operate a desalinization plant?

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1 MR. JOHNSTON: Yes, it could. I don't know, however,
2 whether or not such revenues are included in the costs that
3 Mr. Del Piero --

4 MEMBER DEL PIERO: They are not.

5 MR. JOHNSTON: Okay.

6 MR. BIRMINGHAM: And the potential to reuse that
7 water, the treated water would be something else that would
8 be considered in developing the studies required to permit
9 the drain?

10 MR. JOHNSTON: Yes.

11 MR. BIRMINGHAM: Now, I'd like to go back and talk a
12 little bit about what Mr. Del Piero called the
13 "environmental problems" resulting from the discharge of
14 the drain. I'm going to talk about it in the context of
15 the trial that was conducted before Judge Wanger.

16 The United States asserted in the trial before
17 Judge Wanger that completion of the San Luis Drain had been
18 excused because it would be impossible to obtain the
19 permits necessary to complete the drain under existing
20 environmental regulations; is that correct?

21 MR. JOHNSTON: That's correct.

22 MR. BIRMINGHAM: And how long was the trial before
23 Judge Wanger, how many days did it go on?
24 MR. JOHNSTON: Oh, it lasted probably about two
25 months. I don't know exactly how many days.

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1 MR. BIRMINGHAM: And there were all kinds of experts?

2 MR. JOHNSTON: Yes.

3 MR. BIRMINGHAM: Biologists?

4 MR. JOHNSTON: Yes.

5 MR. BIRMINGHAM: Water quality engineers?

6 MR. JOHNSTON: Yes.

7 MR. BIRMINGHAM: Agricultural engineers?

8 MR. JOHNSTON: Yes.

9 MR. BIRMINGHAM: It was basically experts, that's who
10 Judge Wanger heard from?

11 MR. JOHNSTON: Yes.

12 MR. BIRMINGHAM: And is it correct that at the
13 conclusion of that trial Judge Wanger determined that it
14 could not be determined with certainty that it would be
15 impossible to obtain the permits required to construct the
16 drain in compliance with existing environmental
17 regulations?

18 MR. JOHNSTON: Yes, that's correct.

19 MR. BIRMINGHAM: And he ordered the United States to
20 apply for a permit to determine that question?

21 MR. JOHNSTON: Yes.

22 MR. BIRMINGHAM: Now, during the presentation of the
23 case before Judge Wanger, was there testimony concerning
24 the potential impacts of a discharge into the Delta on
25 water quality?

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1 MR. JOHNSTON: Yes, there was and on wildlife.

2 MR. BIRMINGHAM: And some of the same information is
3 presented in Westlands' Water District Exhibit 27; is that
4 correct?

5 MR. JOHNSTON: Yes. Yes. Prior to the time you
6 arrived this morning we had some discussion about this
7 report.

8 MR. BIRMINGHAM: So, theoretically, through
9 dispersion and through treatments to eliminate salinity
10 through the drainage discharge, it may be possible to
11 construct a drain that discharges into the Delta without,
12 using Mr. Del Piero's words, "environmental problems"?

13 MR. JOHNSTON: Yes.

14 MR. BIRMINGHAM: But the purpose of the studies is to
15 identify those potential environmental problems if they
16 exist and determine means of mitigating them?

17 MR. JOHNSTON: That's correct.

18 MR. BIRMINGHAM: I have no further questions.

19 C.O. CAFFREY: All right. Thank you, Mr. Birmingham.

20 By a showing of hands, do any of the parties wish
21 to recross the rebuttal witness? Mr. Nomellini. Anyone

22 else?

23 All right. Mr. Nomellini, you may proceed, sir.

24 //

25 //

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1 ---oOo---

2 CROSS-EXAMINATION OF WESTLANDS WATER DISTRICT

3 BY THE CENTRAL DELTA PARTIES

4 BY DANTE JOHN NOMELLINI

5 MR. NOMELLINI: Mr. Chairman, Members of the Board,

6 Dante John Nomellini for Central Delta Parties.

7 I believe this is Westlands' 97. And,

8 Mr. Johnston, with regard to Westlands' 97, is it your

9 testimony that there is no lateral movement of water in the

10 direction of the arrows shown on Westlands' 97? I'm

11 talking about the groundwater.

12 MR. JOHNSTON: No, that's not my testimony.

13 MR. NOMELLINI: All right.

14 MR. JOHNSTON: My testimony is that the arrows

15 represent the direction that water might move if it were

16 moving.

17 MR. NOMELLINI: All right. And, in fact, you

18 testified that you calculated a quantity of water that

19 could potentially be moving from the portion of Westlands

20 Water District into the Firebaugh, I think, it was drainage

21 district?

- 22 MR. JOHNSTON: Water District.
- 23 MR. NOMELLINI: Is it Water District?
- 24 MR. JOHNSTON: Yeah.
- 25 MR. NOMELLINI: Is that correct?

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1 MR. JOHNSTON: Firebaugh Canal Water District, excuse
2 me.

3 MR. NOMELLINI: And, in fact, you made a calculation
4 of what you thought that quantity would be?

5 MR. JOHNSTON: Yes.

6 MR. NOMELLINI: All right. If we were to say that
7 there was no movement of water in the direction of the
8 arrows shown on Westlands' Water District 97, and again I'm
9 talking about groundwater, we would have to conclude that
10 the soils were absolutely impermeable; is that correct?

11 MR. JOHNSTON: Pretty close to it, yeah.

12 MR. NOMELLINI: Well, wouldn't it be? We'd have to
13 say there's a gradient here and the soils are impermeable
14 and, therefore, there is no movement of water; is that
15 correct?

16 MR. JOHNSTON: Yes.

17 MR. NOMELLINI: Okay. Now, in determining the amount
18 of water that would move in the direction of the arrows, we
19 have to know something about the permeability of the soil;
20 is that correct?

21 MR. JOHNSTON: Yes.

22 MR. NOMELLINI: And people have described it as
23 transmissivity, because it's horizontal rather than
24 vertical; is that correct?
25 MR. JOHNSTON: Yes. Transmissivity is the rate at

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1 which water will move whether it's horizontal or
2 vertically.

3 MR. NOMELLINI: Okay. Are you aware of the
4 permeability of the soils in the area depicted on
5 Westlands' 97?

6 MR. BIRMINGHAM: Objection. Goes beyond the scope of
7 the redirect.

8 MR. NOMELLINI: Well, the redirect, in fact,
9 Mr. Birmingham asked him and I think he got him to confirm,
10 incorrectly I think I've demonstrated because his testimony
11 was not quite, but Mr. Birmingham got him to confirm that
12 there was no lateral movement here. And I'm just pursuing
13 that as to what information has to be gathered in order to
14 value the degree of movement.

15 MR. BIRMINGHAM: Contrary to what Mr. Nomellini is
16 stating, I don't believe that in response to any question
17 that I asked of this witness on redirect he said there was
18 no lateral movement. I asked him about the arrows on this
19 particular exhibit and what they represented. And that was
20 the extent of my examination with respect to lateral
21 movement.

22 It's just what the arrows on this particular
23 exhibit represent. And Mr. Nomellini is now going into an
24 area which I did not examine the witness on redirect
25 examination.

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1 C.O. CAFFREY: Well, I appreciate your comments and
2 they are in the record, Mr. Birmingham, but I would say
3 it's a close call. And I've got Board Members up here that
4 want to hear the answer and I do, too.

5 So why don't you go ahead, Mr. Nomellini. We'll
6 see where you take us.

7 MR. NOMEILLINI: Yeah. I just might add, that in
8 order to say that these arrows on this exhibit do not
9 reflect movement of water, we would have to conclude, and I
10 was trying to establish that, that all of those soils were
11 impermeable. And I was going to pursue the likelihood of
12 there being soils here that were absolutely impermeable. I
13 think the answer is obvious, but I wanted to get it on the
14 record. And that's --

15 MEMBER DEL PIERO: Are you going to do that?

16 C.O. CAFFREY: Well, are you going to do that?

17 MR. NOMEILLINI: Yeah, that's where I was heading.

18 C.O. CAFFREY: All right. I've allowed you to go
19 ahead.

20 MR. NOMEILLINI: Okay.

21 C.O. CAFFREY: I see what you were doing. When I

22 said, "Let's see where it takes us," you were just

23 offering --

24 MR. NOMELLINI: I was just trying to explain.

25 C.O. CAFFREY: All right. Go ahead, Mr. Nomellini.

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1 MR. NOMELLINI: All right. Mr. Johnston, have you
2 made a determination of what the permeability of a soil is
3 in the area depicted on Westlands' Exhibit Number 97?

4 MR. JOHNSTON: In a portion of that area. However,
5 you made a statement that I said that there is no lateral
6 movement. I don't think I have ever stated that there is
7 no lateral movement. I just said the arrows on that map do
8 not represent the rate and amount of the lateral movement.

9 There is always some lateral movement. And I'd
10 like to read a sentence out of the USGS open file report
11 number 95 -- 90-573 prepared by Steven Phillips and Ken
12 Belitz dated 1990.

13 MR. HOWARD: Excuse me, is that an exhibit?

14 MR. JOHNSTON: I don't know if it's an exhibit or
15 not. All I have to do is read one sentence out of the
16 report. And it says:

17 (Reading):

18 "The horizontal hydraulic gradients are much
19 smaller than the vertical gradients, because the
20 topographic relief in the study area is low.

21 Locally the topographic gradient reaches a

22 maximum of 0.02 at the fan heads. And a minimum
23 of 0.001 towards the valley trough. The
24 hydraulic gradient seldom exceeds the
25 topographic gradient."

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1 And so we're talking about very low numbers here.

2 And I have never said that there is no lateral movement in
3 any of the soils.

4 C.O. CAFFREY: What was the document that you were
5 reading from, Mr. Johnston?

6 MR. JOHNSTON: I'm reading from an U.S. Geological
7 Survey Open-File Report 90-573 entitled "Calibration of a
8 Texture-based Model of a Groundwater Flow System, Western
9 San Joaquin Valley, California."

10 C.O. CAFFREY: Is that one of the exhibits that's in
11 the record, or that somebody is going to offer?

12 MR. JOHNSTON: I do not know if it's in the record.
13 It's "Regional Aquifer-System Analysis prepared in
14 cooperation with the San Joaquin Valley Drainage Program."

15 C.O. CAFFREY: Mr. Birmingham, do you --

16 MR. BIRMINGHAM: It has not been marked as an
17 exhibit. I believe that Mr. Johnston has the right to
18 state the basis of his opinion. And I believe he's
19 indicating he's basing his opinion, in part, on this
20 document.

21 But for the Board's convenience, or if any party

22 would so like we will mark it as Westlands' next in order
23 and have it copied so that it can be served on all of the
24 parties.

25 C.O. CAFFREY: I appreciate that, Mr. Birmingham.

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1 Let's see if we need to do that.

2 Is there a strict requirement, Ms. Leidigh, that
3 since it's part of his testimony, Mr. Johnston identified a
4 document and read from it, is there a strict requirement
5 that that be identified as a particular exhibit, or can it
6 just stand that way as part of his answer?

7 MS. LEIDIGH: I think it can stand as part of his
8 answer since he, obviously, is indicating that he believes
9 that this is true, this statement that's in there is true.
10 He could have made that statement I suspect without
11 reference to the document. So I don't think it's necessary
12 that it be included in the record.

13 C.O. CAFFREY: It is a public document, per se, is it
14 not?

15 MS. LEIDIGH: It appears to be, yes.

16 C.O. CAFFREY: Okay. Thank you.

17 Mr. Nomellini, you had something?

18 MR. NOMEILLINI: Yeah. I think it would be helpful to
19 take Mr. Birmingham up on his offer and put it in the
20 record.

21 C.O. CAFFREY: I'm sorry, I was distracted.

22 MEMBER DEL PIERO: He wants it in the record.
23 C.O. CAFFREY: You want it in the record?
24 MR. NOMELLINI: Yeah, I think it would be helpful to
25 have it identified.

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1 C.O. CAFFREY: I think certainly -- I was trying to
2 economize for folks. If that's what the preference is and
3 if Mr. Birmingham's offer still stands, we could still mark
4 it.

5 MR. NOMELLINI: Because I want to read out of another
6 part of it.

7 C.O. CAFFREY: All right. I see.

8 MR. BIRMINGHAM: Then, we would identify as
9 Westlands' Exhibit 98 a U.S. Geological Survey Open-File
10 Report 90-573, "Calibration of a Texture-Based Model of a
11 Groundwater Flow System, Western San Joaquin Valley,
12 California, Regional Aquifer-System Analysis, Prepared in
13 Cooperation with the San Joaquin Valley Drainage Program."

14 And we will have it copied this afternoon and
15 supply copies to the Board and to the parties that are here
16 this afternoon and serve it on the remaining parties.

17 C.O. CAFFREY: Thank you very much, Mr. Birmingham.

18 MEMBER FORSTER: May I ask: What's the year of that,
19 what's the date?

20 MR. BIRMINGHAM: 1990.

21 C.O. CAFFREY: 1990. Thank you, sir.

22 All right. Mr. Nomellini, you were going to
23 proceed?
24 MR. NOMEILLINI: Yeah, I was going to follow up on
25 this.

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1 C.O. CAFFREY: Go ahead, sir.

2 MR. NOMELLINI: Do you know how much of the area
3 depicted on Westlands' 97 is represented by the model which
4 you just referenced which is going to be Westlands' 98?

5 MR. JOHNSTON: The answer to your question is: No, I
6 don't know exactly. This is a general statement about the
7 west side. And, certainly, the soils on the west side have
8 different permeabilities depending on their location and
9 the source material.

10 MR. NOMELLINI: Okay. So, in fact, based on your
11 knowledge there could be great variability in the
12 permeability of the soils in the area shown on Westlands'
13 97?

14 MR. JOHNSTON: Yes.

15 MR. NOMELLINI: Okay. And you cited permeabilities
16 associated with what we would -- would you agree that you
17 cited permeabilities from this report that are
18 representative of clay-type soils; is that correct?

19 MR. JOHNSTON: Yes. Soils of the type we were
20 talking about near the boundary of Westlands and the
21 Firebaugh Canal Water District.

22 MR. NOMELLINI: All right. And you would agree that
23 when we're talking about a fan, for example, the Panoche
24 fan, that the fringe areas of the fan would contain a
25 greater percentage of clay particles than would, for

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1 example, the head of the fan?

2 MR. JOHNSTON: Yes. There can be a considerable
3 change in the soil permeability as you move up the fan and
4 across the fan.

5 MR. NOMEILLINI: Okay. And, in fact, up the fan there
6 would be greater permeability; is that correct?

7 MR. JOHNSTON: Yes, that's correct.

8 MR. NOMEILLINI: And in the middle of the fan there
9 could be greater permeability as well?

10 MR. JOHNSTON: And variability.

11 MR. NOMEILLINI: All right. And that's because the
12 heavier particles settle out closer to the bed or the
13 stream, so to speak?

14 MR. BIRMINGHAM: Excuse me.

15 C.O. CAFFREY: Mr. Birmingham?

16 MR. BIRMINGHAM: I'm going to renew my objection on
17 the grounds that he has gone well beyond the scope of any
18 redirect. I understood the basis of the Board's earlier
19 ruling on my objection.

20 Mr. Nomellini made the general point, which he was
21 trying to make, a long time ago. Now we're getting into

22 very specific questions that don't relate to anything I
23 asked this witness on redirect.
24 MR. NOMEILLINI: That's true. Where I'm headed now is
25 with regard to the witness' answer dealing with these

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1 references to the permeability. And Mr. Birmingham is
2 right, it wasn't his question that led me in this
3 direction. These particular questions are related to how
4 much is represented by this particular quote.

5 C.O. CAFFREY: Is that the quote that Mr. Johnston
6 made?

7 MR. NOMEILLINI: Yeah, I think I covered it anyway,
8 but I mean that's why I'm where I am. Not because
9 Mr. Birmingham did it, but the witness did it.

10 MR. BIRMINGHAM: All Mr. Nomellini is suggesting is
11 that my earlier objection was, indeed, a close call.

12 C.O. CAFFREY: Well --

13 MR. NOMEILLINI: I don't want to go that far.

14 MR. BIRMINGHAM: But I do think we are now beyond the
15 scope of anything that I asked this witness in my redirect.
16 And, again, I would assume Mr. Johnston could be available
17 if Mr. Nomellini wants to call him as a witness for any
18 rebuttal case that Mr. Nomellini wants to --

19 MR. NOMEILLINI: I know I have that right. The
20 technical issue on this question is: Whether or not if the
21 witness in response to a question opens up an area on his

22 own, can I cross-examine on that area because it is beyond
23 the scope of what Mr. Birmingham asked him? That's the
24 question. And I think I'm entitled to do it.

25 MEMBER DEL PIERO: Ask Barbara.

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1 C.O. CAFFREY: Ms. Leidigh, the question here is in
2 the definition of the redirect or the redirect or the
3 direct rebuttal, in this case the redirect, does the scope
4 include, let's say, areas which may have been opened up by
5 a particular answer, by the broadness of a particular
6 answer of the witness?

7 MR. BIRMINGHAM: If it did, Mr. Caffrey, then there
8 is no limit on recross-examination, because Mr. Johnston
9 has spoken, in response to my questions gave broad answers
10 on many, many subjects. And to say that because in
11 response to a question that was asked of him on
12 recross-examination he gave a broad answer and, therefore,
13 the cross-examiner can go into very specific details about
14 that answer means that there would be no limit on the scope
15 of redirect examination, or recross-examination.

16 C.O. CAFFREY: I do observe some of Mr. Johnston's
17 answers were very broad. And I know that Mr. Stubchaer and
18 I were observing that a little while ago and how this might
19 affect, how this very question might affect the scope of
20 the cross-examination. And I think this is an important
21 question and that's why I'm seeking some advice from

22 Ms. Leidigh.

23 But before you answer, Ms. Leidigh, I think

24 Mr. Stubchaer may have some enlightenment or expansion.

25 C.O. STUBCHAER: No. Just a comment on

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1 Mr. Birmingham's statement that you said "answers under
2 recross." It's not under recross. It's the redirect
3 rebuttal that we're talking about, not recross-examination
4 which narrows the scope somewhat I think.

5 MR. BIRMINGHAM: It does. But Mr. Nomellini has just
6 acknowledged that he's asking this line of questions not
7 based upon anything that I asked, or Mr. Johnston's answers
8 to me, but instead of Mr. Johnston's answer to a question
9 that he asked. And so, in other words, Mr. Johnston
10 because he answered broadly a question asked on redirect
11 he's opened up an entirely new area, excuse me, on recross
12 he's opened up a new area.

13 MEMBER DEL PIERO: Mr. Chairman?

14 C.O. CAFFREY: Yes, Mr. Del Piero.

15 MEMBER DEL PIERO: If I might. I would like to hear
16 Ms. Leidigh's opinion or statement of the law in regard to
17 this.

18 C.O. CAFFREY: Thank you, Mr. Del Piero, so would I.

19 Ms. Leidigh, it's all yours.

20 MS. LEIDIGH: Well, I think that there's a great deal
21 of value to keeping this narrow. You could get into a

22 broad discussion if every marginal statement that a witness
23 makes in response to a question spawns a whole new set of
24 questions. I think that, perhaps, the witness could be
25 asked to answer the question more specifically if there is

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1 a particular question.

2 C.O. CAFFREY: Are you referring to during the time
3 of direct or redirect?

4 MS. LEIDIGH: During the time that he's been
5 cross-examined --

6 C.O. CAFFREY: Well, that's different. You're saying
7 when he's being --

8 MS. LEIDIGH: -- on redirect.

9 MEMBER DEL PIERO: As to the subject question to
10 which Mr. Birmingham is objecting and which Mr. Nomellini
11 wishes to pursue?

12 MS. LEIDIGH: Right.

13 C.O. CAFFREY: I think this gets down to --

14 MS. LEIDIGH: I think that it's not appropriate to
15 reopen the whole thing and go back and start getting into
16 areas that haven't been covered --

17 C.O. CAFFREY: Yeah.

18 MS. LEIDIGH: -- by the attorneys.

19 C.O. CAFFREY: I think what you're talking about here
20 is it may not be a hard-fast rule, but we're dealing with
21 common sense. And I for one, do not want -- of course, I'm

22 only going to be here for two more weeks, but I for one do

23 not want this Board to sit here for infinitum. And I don't

24 want to have us in a situation --

25 MEMBER DEL PIERO: He's just getting nervous because

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1 I took care of the ocean in two days.

2 C.O. CAFFREY: Yeah. We don't want this to turn into
3 Groundhog Day, or whatever that movie is. And so I'm ready
4 to rule. I know where I want to go, but I want to see if I
5 have further enlightenment from Mr. Brown and then from
6 Mr. Herrick.

7 Mr. Brown, you first, sir.

8 MEMBER BROWN: It may be that the question is moot
9 since Mr. Nomellini stated he had made his point and
10 Mr. Birmingham agreed with him. I think we know where
11 you're heading on this. And it may be that you're ready to
12 move on, Mr. Nomellini.

13 MR. NOMELLINI: I don't want to give up the legal
14 position, Mr. Brown.

15 C.O. CAFFREY: I understand.

16 MR. NOMELLINI: I think I'm entitled to pursue that
17 and, therefore, I'm not going to voluntarily withdraw it.

18 C.O. CAFFREY: And I certainly respect that,
19 Mr. Nomellini.

20 MR. NOMELLINI: I will accept the ruling, of course,
21 whatever it might be.

22 C.O. CAFFREY: You were making a statement on the
23 record before that you felt that, perhaps, you had gone as
24 far as you needed to go, but I understand the statement
25 you're making now of not giving up the position.

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1 Mr. Herrick?

2 MR. HERRICK: I would just like to add that I don't
3 believe it's a question of time, or convenience, or ability
4 to recall a witness. If on cross-examination the witness
5 gives an answer that sets forth any issue, to not allow the
6 cross-examiner to explore the basis for that person's
7 understanding of that is simply a question of fairness.
8 That's not the way it works in court and it shouldn't be
9 the way it works here.

10 C.O. CAFFREY: Well, I appreciate your comments as
11 well, Mr. Herrick, but not everything we do here is like
12 what happens in court. We have different regulations and
13 we have different discretions, I might add. And on that
14 note, the note of discretion I think what we're dealing
15 with here is the discretion that I and Mr. Stubchaer have
16 to jointly exercise from time to time.

17 And I think it's going to be on a case-by-case
18 basis always on our part trying to make sure that it's fair
19 to everybody else and fair to the questioner as well as the
20 answerer. I think that Mr. Nomellini has taken this -- we
21 allowed him, on a close call, to go a little ways. I think

22 he went a little ways.

23 And I think now I have to agree with

24 Mr. Birmingham that we may be entering into a broader area

25 and that Mr. Nomellini, recognizing with great respect,

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1 Mr. Nomellini, that you're not giving up the point, I think
2 that it might be more appropriate for you to pursue this
3 line of questioning in a rebuttal case. So with that, why
4 don't we move on to something else.

5 MR. NOMELLINI: Okay. I take that as sustaining the
6 objection?

7 C.O. CAFFREY: I'm sustaining that particular
8 objection at this time. But I'm also saying for the record
9 that as each of these objections come up, if there were
10 further, we'll have to make a separate judgment, see how
11 far you're going. As a matter of fact, since it is about
12 14 minutes to 12:00 why don't we break now -- well, before
13 we break we're going to hear from Mr. Birmingham, again.

14 Go ahead, Mr. Birmingham.

15 MR. BIRMINGHAM: We are, because the last time I made
16 this comment it wasn't on the record. I've heard
17 Mr. Del Piero say repeatedly he can handle the ocean in two
18 days, and I just want to go back and remind Mr. Del Piero
19 that we had a hearing that was supposed to take 10 days and
20 it ended up taking 44, in which he was the Hearing Officer.

21 C.O. CAFFREY: That's right.

22 MEMBER DEL PIERO: Yeah, you guys kept wanting to go
23 home early. I couldn't understand that.
24 C.O. CAFFREY: And I think the subsequent hearing on
25 the restoration phase only lasted about five days and I

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1 chaired that one. So I think Mr. Del Piero and I are
2 reversing positions.

3 MEMBER DEL PIERO: Mr. Chairman, I have to say right
4 now, right here, Birmingham kept wanting to go home at 9,
5 10:00 o'clock at night and I really didn't understand it.

6 C.O. CAFFREY: He wanted to go home early. On that
7 light note, let's take a break. And we do have to come
8 back a little bit later today, Mr. Stubchaer and I have a
9 couple of meetings. We will reconvene at 1:30.

10 Mr. Brandt, do you have something?

11 MR. BRANDT: Yes, Mr. Chairman. I just want do
12 clarify what the plan and intent of the Board is as to
13 II-A. If we have no witnesses -- if we get done today with
14 all the witnesses except for South Delta's, what would be
15 the Board's intention, to start II-A tomorrow?

16 C.O. CAFFREY: Mr. Stubchaer and I did discuss that.
17 If we have time available sometime today or tomorrow, we
18 have a half day tomorrow, if there were parties ready to
19 start their cases in II-A we would be willing to start.

20 MR. BRANDT: In that case, could we find out does the
21 Board staff have an order so we know who's starting? We're

22 just thinking about witnesses.

23 C.O. CAFFREY: Why don't we do that when we come
24 back, unless you need to know that now. When we come back
25 at 1:30 we'll open up with some discussion about that.

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1 MR. BRANDT: That would be fine.

2 C.O. CAFFREY: Thank you. See you all at 1:30.

3 (Luncheon recess.)

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1 WEDNESDAY, DECEMBER 9, 1998, 1:30 P.M.

2 SACRAMENTO, CALIFORNIA

3 ---oOo---

4 C.O. STUBCHAER: Chairman Caffrey is going to be
5 delayed, so we will resume and he will take over when he
6 gets back. But before you resume your cross-examination,
7 Mr. Nomellini, are the Exchange Contractors ready to put on
8 their rebuttal today?

9 MR. MINASIAN: We are, Mr. Chairman.

10 C.O. STUBCHAER: Okay. So that would be next after
11 this cross-examination is completed. And, then, is the
12 City of Stockton here?

13 MS. HARRIGFELD: Yes.

14 C.O. STUBCHAER: Are you ready for your rebuttal?

15 MS. HARRIGFELD: No.

16 C.O. STUBCHAER: Will you be tomorrow?

17 MS. HARRIGFELD: I'm not sure I'm doing any, but I
18 will know tomorrow.

19 C.O. STUBCHAER: Okay. All right, Mr. Nomellini.

20 MR. BIRMINGHAM: Excuse me, Mr. Stubchaer?

21 C.O. STUBCHAER: Yes, Mr. Birmingham.

22 MR. BIRMINGHAM: We now have copies of Westlands'
23 Water District Exhibit 98, which was identified before the
24 lunch recess. And copies are now available for the
25 parties.

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1 C.O. STUBCHAER: Okay. Everybody hear that? Okay.

2 Thank you, Mr. Birmingham.

3 Mr. Nomellini.

4 MR. NOMELLINI: I wonder if I could hiring Birmingham

5 to run the copies for my office, he seems to be most

6 efficient with this task. Thank you, Tom.

7 All right. I think we left off with an objection

8 to my line of questioning, so we're going to abandon that,

9 Bill. In your testimony to questions by Mr. Birmingham you

10 indicated that the construction of a drain, and I think it

11 was a completed drain which I assume has a discharge point

12 someplace, would improve water quality in the San Joaquin

13 River.

14 Was that your testimony?

15 MR. JOHNSTON: Yes, it was.

16 MR. NOMELLINI: If a drain was completed would there

17 still be a need for dilution flows from New Melones to

18 maintain the Vernalis salinity standard?

19 MR. JOHNSTON: I think that that's a difficult

20 question to ask -- answer, pardon me. There probably would

21 be some need to have dilution flows depending on the

22 standards that the Board set at Vernalis or elsewhere in
23 the San Joaquin River. Whether or not it would all be the
24 responsibility of the Bureau at that point in time is
25 another question that's unanswered. So --

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1 MR. NOMELLINI: Without attributing responsibility or
2 trying to say who.

3 MR. JOHNSTON: There may a need for some dilution
4 factor, dilution flows to meet given standards along the
5 various points along the river.

6 MR. NOMELLINI: All right. And that would include,
7 if we assume that an effort is undertaken to restore the
8 San Joaquin River upstream of Vernalis that even with a
9 drain, the likelihood would be that there would be a need
10 for some dilution flow?

11 MR. JOHNSTON: That's possible.

12 MR. NOMELLINI: Okay. And is that because the
13 drainage component of the salinity in the San Joaquin River
14 is like, I think you testified, was about a third of the
15 source of salinity?

16 MR. JOHNSTON: Yes. What I said was about a third of
17 the salt in the San Joaquin River comes from agricultural
18 discharges. A portion not counted in that, of course,
19 would be surface runoff from the wetlands areas, which
20 contribute a substantial amount of salt and then other
21 miscellaneous.

22 MR. NOMELLINI: In terms of your estimate of the
23 one-third being due to agricultural drainage, in your
24 estimate did you include accretions to the San Joaquin
25 River as being a product of agricultural operations?

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1 MR. BIRMINGHAM: Objection. Misstates the evidence.

2 MR. NOMELLINI: I may have used the wrong words,
3 but --

4 MR. BIRMINGHAM: I believe that the testimony was
5 that Mr. Johnston had not done an analysis. Instead, he
6 was basing his testimony on reports he had read from the
7 Regional Water Quality Control Board.

8 C.O. STUBCHAER: You want to restate the question,
9 Mr. Nomellini?

10 MR. NOMELLINI: Yeah. Based on whatever your
11 informational source is, Regional Water Quality Control
12 Board or otherwise, is it your testimony that in your
13 opinion the agricultural contribution of salinity in the
14 San Joaquin River is about one-third?

15 MR. JOHNSTON: Yes.

16 MR. NOMELLINI: Okay. Now, in that estimate of the
17 one-third, do you include in that accretions to the San
18 Joaquin River that add salt?

19 MR. JOHNSTON: I do not believe that the Regional
20 Board counted the accretions to the river as part of the
21 direct discharge from agriculture.

22 MR. NOMELLINI: Okay.

23 MR. JOHNSTON: In other words, that's a separate

24 amount.

25 MR. NOMELLINI: And those accretions could be, in

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1 part, related to the application of irrigation water, could
2 they not?

3 MR. JOHNSTON: Yes. And with properly constructed
4 drains you could probably pick up some of the salt that
5 comes into the river through these accretions.

6 MR. NOMEILLINI: Okay. And there would be some that
7 you could not pick up, because it would have been downslope
8 from the drain?

9 MR. JOHNSTON: More than likely -- well, no. You
10 could put a drain right along the river, but chances of
11 picking up 100 percent of the accretions in the river would
12 be probably pretty slim.

13 MR. NOMEILLINI: Okay, thank you. With regard to the
14 conclusions in the Rainbow Report that you took issue with
15 I thought I heard you say that you took issue with the .35
16 acre-feet per acre reduction in water going into the
17 underground. Is that -- perhaps, you can tell me again
18 what you --

19 MR. JOHNSTON: Let me try and clarify that. The
20 basic assumption in the report was that in Westlands Water
21 District .75 acre-feet per acre was seeping into the

22 underground. And the recommendation in this report was
23 that that quantity of .75 acre-feet per acre be reduced to
24 .35 acre-feet per acre.

25 And my contention is that there is no way that

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1 there's sufficient water supply in Westlands Water District
2 for .75 acre-feet per acre to be going into the underground
3 to begin with. And even with the reduction there is
4 probably not going to be .35 acre-feet per acre remaining.
5 So the assumption that there can be a reduction of .4
6 acre-feet per acre of applied water in Westlands Water
7 District is, in my opinion, not correct.

8 MR. NOMELLINI: Okay. You would agree, would you
9 not, that you could make such a reduction if you fallowed
10 some of the acreage within Westlands?

11 MR. JOHNSTON: On the average you could make such a
12 reduction. You couldn't make it on land that would be
13 irrigated.

14 MR. NOMELLINI: Okay. But, I think you're testimony
15 was, was it not, that farmers are allotted a certain amount
16 of water by Westlands, which is I think you said 2.7
17 acre-feet per acre or thereabouts, and that they're left to
18 fend for themselves as to how they want to use that water
19 either to reduce the number of acres that they're going to
20 irrigate, or pump additional water to make up for the
21 difference between evapotranspiration of the particular

22 crop they want to grow and what they get delivered from
23 Westlands? Is that pretty much what your testimony was?
24 MR. JOHNSTON: That's close to what my testimony was.
25 The only difference is that the 2.7 is the average for the

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1 entire district for the amount of water that's been used.
2 The 1.4 to 1.5 million acre-feet per year divided by the
3 544,000 irrigated acres, so that's an average of a total
4 supply that's been used.

5 MR. NOMELLINI: Okay. Going back to the Rainbow
6 Report question, then you would agree, would you not, that
7 if a .40 reduction in acre-feet per acre delivered
8 occurred, then farmers would have to farm less land in all
9 probability?

10 MR. JOHNSTON: What the report is assuming is that
11 there's an over-application of water resulting in this .75
12 acre-feet per acre going into the water table at the time
13 the report was written. My contention is that that
14 situation did not exist, because sufficient water was not
15 supplied to the area to cause that to happen. And the
16 recommendation in the report is that that be reduced to .35
17 acre-feet per acre.

18 MR. NOMELLINI: Okay. So your problem with the
19 report is really in the assumption that there was
20 over-application to the degree that they had --

21 MR. JOHNSTON: That's correct.

22 MR. NOMEILLINI: -- assumed? Okay. Now, with regard
23 to the 2.7 acre-feet per acre, is that, would you contend
24 to be, representative of the total water applied by farmers
25 in the Westlands Water District?

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1 MR. JOHNSTON: Approximately, yes.

2 MR. NOMELLINI: Okay. And that would include
3 deliveries from the Delta-Mendota Canal or San Luis Canal?

4 MR. JOHNSTON: Yes.

5 MR. NOMELLINI: Water transfers that bring water in?

6 MR. JOHNSTON: Yes.

7 MR. NOMELLINI: Groundwater pumping?

8 MR. JOHNSTON: Yes.

9 MR. NOMELLINI: The whole gamut of sources?

10 MR. JOHNSTON: Correct.

11 MR. NOMELLINI: And I think you had indicated that it
12 was 2.5 to 3 feet on the average, the evaporation,
13 evapotranspiration needs of crops grown in Westlands?

14 MR. JOHNSTON: That's correct.

15 MR. NOMELLINI: So the balance of the water needs to
16 grow a particular crop would have to come from rainfall?

17 MR. JOHNSTON: Rainfall is insignificant.

18 MR. NOMELLINI: Okay.

19 MR. JOHNSTON: The balance would come by manipulating
20 acreages and growing crops of different consumptive
21 origins.

22 MR. NOMELLINI: Okay. So in other words, somebody
23 has to lose some production in some aspect to get by even
24 with the water supplies the way they are now?
25 MR. JOHNSTON: Yeah, that's correct.

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1 MR. NOMELLINI: Okay. And in that 2.7 acre-feet per
2 acre any leaching factor would also have to be included in
3 that, would it not?

4 MR. JOHNSTON: Yes.

5 MR. NOMELLINI: Do you know on the average how much
6 land is idle within Westlands Water District?

7 MR. JOHNSTON: I don't recall specifically, but I
8 could look at some of their crop reports and find out. I
9 don't know right offhand. It's not very much.

10 MR. NOMELLINI: Okay. Do you know for a fact that
11 each year on the average land is idled in order to get this
12 irrigation job done?

13 MR. JOHNSTON: No, I don't.

14 MR. NOMELLINI: All right. There was quite a bit of
15 testimony by you with regard to the settlement agreement
16 which was Westlands' 95. Was that settlement agreement
17 ever executed?

18 MR. JOHNSTON: Yes.

19 MR. NOMELLINI: And has any of the land been
20 purchased by Westlands District that was referenced in that
21 settlement agreement?

22 MR. JOHNSTON: I don't know.

23 MR. NOMELLINI: Now, you had indicated that the
24 complaint by the plaintiffs in that case was against both
25 the Westlands and the Bureau because of the removal of the

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1 drainage system which used to serve, I think you said,
2 42,000 acres; is that correct?

3 MR. JOHNSTON: Yes.

4 MR. NOMELLINI: Shown on this Westlands -- I think
5 it's Exhibit 8 of Westlands' 95 is a crosshatched area that
6 encompasses much more than 42,000 acres, would it not?

7 MR. JOHNSTON: Yes.

8 MR. NOMELLINI: And do you know why there would be
9 water purchases of any of the other acreage that's
10 crosshatched on Exhibit A to Westlands' 95?

11 MR. JOHNSTON: I think yesterday when we were talking
12 about this map, we decided -- you read a paragraph out of
13 the settlement agreement that said the land that would be
14 purchased would be north of Elkhorn Avenue, which is one
15 mile south of Cantua Creek. So the land purchases would
16 be, certainly, less than half of this area, within less
17 than half of the area. And it would be in areas that the
18 Bureau originally contemplated would need drainage.

19 MR. NOMELLINI: So the north of Elkhorn Avenue is
20 basically the 42,000 acres?

21 MR. JOHNSTON: No. It's more than the 42,000 acres.

22 The 42,000 acres would be in about the northern half of
23 that area.

24 MR. NOMELLINI: Okay. And you're saying that even
25 though it wasn't served by drainage that it was planned

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1 that it would have been served by drainage?

2 MR. JOHNSTON: That's correct. And two of the
3 plaintiffs were in that area.

4 MR. NOMELLINI: Okay. And was it a plan to provide
5 drainage to any of the area that's crosshatched on Exhibit
6 A to Westlands' 95 that's south of Elkhorn Avenue?

7 MR. JOHNSTON: The original plan was to provide
8 drainage to the entire crosshatched area. However, as I
9 explained this morning, there's a map in Westlands' Exhibit
10 27 that shows a smaller area of 200,000 acres that we now
11 believe will be the area that would ultimately need
12 drainage.

13 MR. NOMELLINI: Okay. If the settlement agreement
14 that was Westlands' 95 was carried out, what acreage within
15 Westlands would still require service from a drain?

16 MR. JOHNSTON: Well, it would be 200,000 acres less
17 whatever acreage is sold and taken out of service.

18 MR. NOMELLINI: Okay.

19 MR. JOHNSTON: I don't know if there's a limit on how
20 many acres they might buy.

21 MR. NOMELLINI: Okay. I think you said that

22 ultimately drainage was going to be required for about
23 100,000 acres. Did I get that wrong?
24 MR. JOHNSTON: I said that the map, Exhibit A of
25 exhibit --

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1 MR. NOMELLINI: 95.

2 MR. JOHNSTON: -- 95, Westlands' 95 shows an area
3 that would ultimately need drainage of 300,000 acres. That
4 was the original plan when the drainage system was
5 conceived and laid out. Since that time there's been
6 additional work and additional monitoring of the
7 groundwater table. And we now believe an area of about
8 200,000 acres will ultimately need drainage once a drain is
9 available.

10 MR. NOMELLINI: All right. In this lawsuit that led
11 to the settlement agreement that is Westlands' 95, did the
12 plaintiffs in addition to complaining about the
13 discontinuation of the provision of drainage services also
14 complain about the water applications on upslope
15 agricultural lands aggravating their drainage problems on
16 the lower-slope area?

17 MR. JOHNSTON: No.

18 MR. NOMELLINI: You indicated that Westlands includes
19 about 545,000 acres of irrigated lands; is that correct?

20 MR. JOHNSTON: Yes.

21 MR. NOMELLINI: Has that acreage of irrigated lands

22 changed since 40 years ago?

23 MR. JOHNSTON: As I stated yesterday, approximately

24 95 percent of the land in Westlands Water District was

25 irrigated prior to the time project water was made

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1 available.

2 MR. NOMELLINI: Was all of that acreage within the
3 Westlands Water District 40 years ago?

4 MR. JOHNSTON: Well, Westlands Water District was
5 formed in 1952. And in 1965 Westlands was merged with what
6 was known as the West Plains Water Storage District.
7 Roughly the area of Westlands would have been the area east
8 of the San Luis Canal and the area of the West Plains Water
9 Storage District would have been the area west of the San
10 Luis Canal in the presently configured Westlands Water
11 District.

12 MR. NOMELLINI: Okay. Any additions since 1962 to
13 the acreage within Westlands Water District?

14 MR. BIRMINGHAM: I believe the witness just testified
15 about additions in 1965. I believe Mr. Nomellini --

16 MR. NOMELLINI: I wrote down '62. I'm sorry. '65?

17 MR. JOHNSTON: '65 was the merger.

18 MR. NOMELLINI: Thank you. Since '65, any other
19 additions?

20 MR. JOHNSTON: There may have been a few annexations
21 of half a section here and there, but I don't recall

22 specifically. There are also some detachments that
23 occurred.

24 MR. NOMELLINI: In your testimony with regard to
25 construction of a drain, is it your testimony that

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1 Westlands was willing to build and operate a drain at its
2 own cost?

3 MR. JOHNSTON: I don't think I testified about that,
4 but I think the answer to the question is: Yes, Westlands
5 would be willing to do that.

6 MR. NOMELLINI: And that would involve treatment or
7 whatever went along with it?

8 MR. JOHNSTON: Yes.

9 MR. NOMELLINI: You talked about Judge Wanger's
10 decision with regard to a drain. Do you know whether or
11 not Judge Wanger left open the question of where such a
12 drain might discharge?

13 MR. JOHNSTON: Yes, he did leave that open. He said
14 that the Bureau should do the studies and try to obtain a
15 permit to construct a drain. And he didn't specify to
16 where.

17 MR. NOMELLINI: All right. And, in your opinion, a
18 drain to the ocean could meet the reference to a drain that
19 Judge Wanger made in his decision?

20 MR. JOHNSTON: I believe it could.

21 MR. NOMELLINI: Okay. That's all I have. Thank you.

22 C.O. STUBCHAER: Thank you, Mr. Nomellini.
23 MR. NOMEILLINI: Thank you, Bill.
24 C.O. STUBCHAER: Unless somebody has changed their
25 mind, that concludes the cross-examination except for the

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1 staff and the Board Members. Is there anyone else?

2 MS. HARRIGFELD: Would you let me change my mind?

3 C.O. STUBCHAER: You're not sandbagging, are you?

4 MS. HARRIGFELD: No.

5 C.O. STUBCHAER: Okay.

6 MR. NOMELLINI: Do you want either of these two over
7 there?

8 MS. HARRIGFELD: No.

9 ---oOo---

10 CROSS-EXAMINATION OF WESTLANDS WATER DISTRICT

11 BY CITY OF STOCKTON

12 BY KARNA HARRIGFELD

13 MS. HARRIGFELD: Mr. Johnston, today you seemed to
14 indicate that reverse osmosis would remove salt but not
15 selenium, is that the case, or would it remove selenium as
16 well if you actually went through reverse osmosis?

17 MR. JOHNSTON: My understanding of the reverse
18 osmosis process is it does not remove the selenium
19 sufficiently to be considered a waste you wouldn't have to
20 worry about for wildlife.

21 MS. HARRIGFELD: Thank you.

22 C.O. STUBCHAER: Okay. You're welcome.

23 Mr. Birmingham, exhibits? Excuse me, I'm sorry,

24 Mr. Howard, you had a question?

25 MR. HOWARD: I just have a quick clarification. My

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1 recollection of the Rainbow Report is that it recommended a
2 depercolation limit of 0.4 acre-feet per acre and a
3 reduction of depercolation in Westlands Water District of
4 0.35 acre-feet per acre.

5 When you were responding to Mr. Nomellini's
6 question, those numbers appeared to be exchanged. Do you
7 agree with my recollection, or is it the other way around?

8 MR. JOHNSTON: Why don't we look and see?

9 MR. HOWARD: Okay.

10 MR. JOHNSTON: I'll read the sentence that it says
11 under Westlands Subarea, Page 7, it says:

12 (Reading):

13 "Improve on farm water conservation and source
14 control on all irrigated lands and reduce
15 depercolation on lands having drainage problems
16 by .35 acre-feet per acre as soon as possible."

17 So you're correct.

18 MR. HOWARD: Thank you.

19 C.O. STUBCHAER: Anything else, Mr. Howard?

20 MR. HOWARD: No, that was it.

21 C.O. STUBCHAER: Ms. Leidigh?

- 22 MS. LEIDIGH: No, nothing.
- 23 C.O. STUBCHAER: Mr. Brown?
- 24 MEMBER BROWN: Yes, I have a question or two. Of the
- 25 545,000 acres, approximately what is the crop mix, three or

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1 four major crops?

2 MR. JOHNSTON: Well, obviously -- not obviously, but
3 cotton is the major crop that's grown, tomatoes,
4 cantaloupe, safflower, wheat and there's a large variety of
5 vegetable crops now being grown, almonds, alfalfa, alfalfa
6 seed.

7 MEMBER BROWN: There's some almonds?

8 MR. JOHNSTON: Yes.

9 MEMBER BROWN: Any other permanent crops?

10 MR. JOHNSTON: Grapes, vines.

11 MEMBER BROWN: What's the mix between permanent crops
12 and annual crops?

13 MR. JOHNSTON: I don't know today. I know it's
14 increased substantially over the last 20 years. I think we
15 have -- Westlands has submitted as part of its exhibits
16 reports on crop mixes.

17 MEMBER BROWN: Would you just have a guess, half and
18 half?

19 MR. JOHNSTON: No, it's probably not half and half.

20 MEMBER BROWN: Not half?

21 MR. JOHNSTON: Maybe a third.

22 MEMBER BROWN: Oh, of the two-thirds of field and row
23 crops, how many acres would you estimate are furrow
24 irrigated?
25 MR. JOHNSTON: Most of it, but there is a substantial

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1 ir -- preirrigation with sprinkler irrigation. And
2 sprinkler irrigation has come in to use more and more over
3 the last ten years as the water supply has become less
4 certain.

5 MEMBER BROWN: For just preirrigation, mainly?

6 MR. JOHNSTON: Well, major preirrigation. In some
7 crops there are solid set sprinklers installed. So for me
8 to give you a general answer I don't feel comfortable doing
9 that, because the irrigation practices have changed
10 substantially over the last ten years.

11 And I know the farmers are getting much more
12 careful with their water supply, because the price of the
13 water has gone up, the supply is less certain. And they've
14 had -- they've been rationed. So as that happens -- has
15 happened, why, they've instituted more precise irrigation
16 application techniques. Despite the fact that with furrow
17 irrigation and short runs they can be very efficient.

18 MEMBER BROWN: What are the runs?

19 MR. JOHNSTON: Well, they -- in general, the
20 recommendations of the advisors that are advising on
21 irrigation in Westlands has been that they reduce the runs

22 to at least a quarter of a mile. Back in the days when
23 they were irrigating with wells they used to have mile-long
24 furrows. And so --
25 MEMBER BROWN: How long does it take to complete a

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1 run, average?

2 MR. JOHNSTON: To complete a --

3 MEMBER BROWN: A furrow run to get across the field?

4 MR. JOHNSTON: About a quarter of a mile?

5 MEMBER BROWN: Yeah.

6 MR. JOHNSTON: Usually a day or less.

7 MEMBER BROWN: So it takes maybe 24 hours to irrigate
8 the furrow?

9 MR. JOHNSTON: Yes. The water would generally get to
10 the end of the furrow before 24 hours.

11 MEMBER BROWN: Then you hold it down for a couple
12 hours after that?

13 MR. JOHNSTON: Then they would change the set and
14 move the gated pipes after a 24-hour run.

15 MEMBER BROWN: So in summary, maybe about half the
16 lands are furrow irrigated, preirrigated with sprinklers,
17 or a good portion of them, and it takes about 24 hours for
18 a set. And have you estimated the irrigation efficiency?

19 MR. JOHNSTON: I said earlier that I think the
20 irrigation efficiency in Westlands is 80 percent or better
21 in most cases.

22 MEMBER BROWN: On these lands, too?

23 MR. JOHNSTON: Oh, yeah.

24 MEMBER BROWN: 80-percent average, or 80 percent for

25 the furrow?

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1 MR. JOHNSTON: 80-percent average. Any irrigation
2 practice can be efficient or inefficient depending on the
3 management of a system and the farmer.

4 MEMBER BROWN: What adept do you try to accomplish in
5 your furrow?

6 MR. JOHNSTON: What did you ask?

7 MEMBER BROWN: The depth of penetration for water,
8 what, normally, do you look for in your furrow with cotton
9 or something?

10 MR. JOHNSTON: Well, in the preirrigation for cotton
11 they try to get five and six feet deep.

12 MEMBER BROWN: I'm thinking about the normal, not
13 preirrigation but the other irrigation, 24 inches?

14 MR. JOHNSTON: They would want to get to the depth of
15 the roots. I mean you would want to saturate the ground to
16 the depth of the root.

17 MEMBER BROWN: So what on the average would that be?

18 MR. JOHNSTON: So early in the season you wouldn't
19 have to apply as much water as you would as later in the
20 season.

21 MEMBER BROWN: What do you estimate that would be

22 with cotton, what would you normally shoot for?

23 MR. JOHNSTON: Well, you're asking me about an

24 average. When you grow crops like onions --

25 MEMBER BROWN: With cotton what do you normally shoot

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1 for?

2 MR. JOHNSTON: The depth of the cotton root, if it's
3 early in the season you'd go a foot or two and later in the
4 season you'd irrigate to about five feet.

5 MEMBER BROWN: So the average would be about 2 and a
6 half, 3 feet?

7 MR. JOHNSTON: Yeah.

8 MEMBER BROWN: Thank you, Mr. Chairman.

9 C.O. STUBCHAER: That concludes the
10 recross-examination. Mr. Birmingham?

11 MR. BIRMINGHAM: Westlands Water District moves for
12 the admission of Exhibits 28 through 88 and Exhibits 96,
13 which is the Generalized Hydrology of the Central Panoche
14 Fan; 97, the location of various irrigation districts in --
15 irrigation and water districts in relation to Westlands
16 Water District with the infamous red arrows; and Exhibit
17 98, which is the USGS report on Calibration of
18 Texture-Based Model of a Groundwater Flow System, Western
19 San Joaquin Valley, California, Report Number 90-573.

20 C.O. STUBCHAER: Mr. Howard, do you agree with the
21 numbers?

22 MR. HOWARD: Yes, that's correct.

23 C.O. STUBCHAER: Any objection to receiving this

24 evidence into the record? Seeing none, they are accepted.

25 And Mr. Caffrey will now resume the Chair.

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1 C.O. CAFFREY: Thank you very much, Mr. Stubchaer.

2 That takes us to the rebuttal case of the Exchange

3 Contractors, am I right, Mr. Minasian?

4 MR. MINASIAN: You are correct. Mr. Deverel and

5 Mr. White. There is a stipulation, or at least a

6 discussion that we'd like to have with the Board first.

7 C.O. CAFFREY: All right. Mr. Sexton, good

8 afternoon.

9 MR. SEXTON: Mr. Chairman, on behalf of San Luis and

10 Delta-Mendota Water Authority and the Exchange Contractors,

11 the Board is aware that the San Luis and Delta-Mendota

12 Water Authority and Exchange Contractors are signatory to

13 the San Joaquin River Agreement. That that agreement --

14 the evidence of that agreement has already been presented

15 to the Board and further evidence will be presented in

16 Phase II.

17 C.O. CAFFREY: II-A.

18 MR. SEXTON: In that regard, early in this proceeding

19 we asked the Board to agree that we could reserve the

20 presentation of any adverse testimony against any of the

21 parties to that agreement until a later phase assuming

22 Phase VIII if, in fact, there is a Phase VIII. And the
23 Board has agreed to that in writing. I just want to make
24 sure that's on the record before we go further with the
25 presentation today.

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1 C.O. CAFFREY: That is, certainly, the case. And are
2 you expressing concern about the possibility of where the
3 cross-examination might lead?

4 MR. SEXTON: The purpose of just making this clear to
5 the Board is, obviously, from the tone of the testimony
6 that you've already received and that you're going to
7 receive, it will become evident to the Board that there is
8 some disagreement. And there is disagreement among the
9 parties that are involved in drainage issues on the entire
10 west side. What we have chosen to do is rather than
11 present testimony adverse to one another in this
12 proceeding --

13 C.O. CAFFREY: I see.

14 MR. SEXTON: -- we have attempted through the San
15 Joaquin River Agreement to take care of any of the
16 responsibilities for the San Joaquin River. And through
17 various other agreements, which will be testified to in the
18 Exchange Contractors' rebuttal case, we're trying to work
19 among one another to work on these issues.

20 C.O. CAFFREY: All right. I appreciate your
21 expression of clarification, Mr. Sexton.

22 And I believe the witnesses have not yet been
23 sworn in.
24 MR. MINASIAN: They have not been sworn. If you
25 would swear Mr. White and Mr. Deverel.

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1 C.O. CAFFREY: Gentlemen, please, rise. Raise your
2 right hand. You promise to tell the truth in these
3 proceedings?

4 MR. WHITE: I do.

5 MR. DEVEREL: Yes.

6 C.O. CAFFREY: Thank you, gentlemen. Please, be
7 seated.

8 ---oOo---

9 REBUTTAL CASE FOR THE EXCHANGE CONTRACTORS

10 BY STEVEN DEVEREL AND CHRISTOPHER WHITE

11 BY PAUL MINASIAN

12 MR. MINASIAN: Is your name Chris White?

13 MR. WHITE: Yes.

14 MR. MINASIAN: And, Mr. White, are you a registered
15 civil engineer?

16 MR. WHITE: In the State of California, yes.

17 MR. MINASIAN: And have you worked in the Los Banos
18 area for more than a decade?

19 MR. WHITE: For 21 years, as a matter of fact.

20 MR. MINASIAN: And have you also been the assistant
21 manager and now the newly appointed manager to be of the

22 Central California Irrigation District?

23 MR. WHITE: That is correct.

24 MR. MINASIAN: And in the course of your duties with
25 the engineering firm that you work with and then with CCID

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1 since the early 1990's, have you become intimately familiar
2 with an area known as Camp 13 area of Central California
3 Irrigation?

4 MR. WHITE: Yes, that's correct.

5 MR. MINASIAN: And you'll be able to testify in
6 regard to your knowledge of drainage conditions, farming
7 practices and the activities of the Central California
8 Irrigation District?

9 MR. WHITE: Yes, I am.

10 MR. MINASIAN: Mr. Deverel, are you the famous Steve
11 Deverel of USGS fame?

12 DR. DEVEREL: I work for the USGS.

13 MR. MINASIAN: Okay. And, Mr. Deverel, basically are
14 you a Ph.D. out of the University of California at Davis
15 before joining the USGS?

16 DR. DEVEREL: I received a Ph.D. in soil science from
17 the University of California at Davis in 1983.

18 MR. MINASIAN: And how many years did you work for
19 the USGS?

20 DR. DEVEREL: Ten years.

21 MR. MINASIAN: And did you work in areas other than

22 the west side of the San Joaquin Valley?

23 DR. DEVEREL: I did a fair amount of work in the

24 Sacramento and also with subsidence of water quality.

25 MR. MINASIAN: And you have published articles both

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1 as a USGS employee and after leaving the USGS several years
2 ago?

3 DR. DEVEREL: That's right. I published journal
4 articles and USGS reports related to those two subjects.

5 MR. MINASIAN: Did you in your course of employment
6 with the USGS, were you asked to do investigations in the
7 Western San Joaquin Valley?

8 DR. DEVEREL: Yes, I was.

9 MR. MINASIAN: And did those investigations in
10 several instances result in your joint authorship of
11 articles in regard to salinity, water conditions and
12 drainage conditions?

13 DR. DEVEREL: Yes. I think there was about 20 papers
14 published, reports and papers published during that period
15 of time.

16 MR. MINASIAN: And did some of those articles and
17 publications, were they published while you were an
18 employee of the USGS and, therefore, had to go through the
19 very substantial review process the USGS has?

20 DR. DEVEREL: Yes, all those were published during my
21 tenure at USGS.

22 MR. MINASIAN: Since going into private practice have
23 you performed various work for Water Quality Exchange
24 Contractors in regard to salinity, drainage and water
25 conditions?

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1 DR. DEVEREL: Yes. I have been working for the
2 Exchange Contractors since about 1996.

3 MR. MINASIAN: Mr. White, let's start with a vicinity
4 map. And this is 4G and there's been a good deal of talk
5 about the names of various districts. Does Exhibit 4G
6 basically locate these various districts and zones for the
7 Board?

8 MR. WHITE: Yes, it locates the districts in the
9 vicinity west to northwest of the City of Mendota.

10 MR. MINASIAN: And would you point out the Mendota
11 pool and the town of Mendota for the Board.

12 MR. WHITE: Sure. The Mendota pool is located just
13 north of the city of Mendota, which is located here toward
14 the southeast corner of the map. Right along Derrick
15 Avenue.

16 MR. MINASIAN: Okay.

17 MR. WHITE: Mendota pool the San Joaquin River. This
18 is the city of Firebaugh. And the San Joaquin River leaves
19 the map here.

20 MR. MINASIAN: How many acres are within what's
21 called the Camp 13 area of Central California Irrigation

22 District?

23 MR. WHITE: Approximately 6,000 acres.

24 MR. MINASIAN: And is it simply an area that's

25 designated Camp 13 for the purposes of drainage management?

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1 MR. WHITE: That's correct. And they're in the
2 process of forming their own drainage entity.

3 MR. MINASIAN: And is the whole Central California
4 Irrigation District approximately 150,000 acres?

5 MR. WHITE: That's correct.

6 MR. MINASIAN: Now, let's turn our attention just for
7 a moment to the question of Camp 13 and what is being
8 experienced in Camp 13. Mr. White, if you'd turn to Page 2
9 of your testimony.

10 There was testimony by various witnesses, City of
11 Stockton, Stockton East Water District in regard to
12 advisability of establishing TMDLs, or load limits in the
13 areas that are draining into the San Joaquin River.

14 Is the Camp 13 6,000 acres part of what we call
15 the Grasslands Bypass Farmers Project?

16 MR. WHITE: That's correct.

17 MR. MINASIAN: Okay. And it does drain through the
18 San Luis Drain and pursuant to the bypass project into the
19 San Joaquin River, does it not?

20 MR. WHITE: That's correct.

21 MR. MINASIAN: And if, in fact, TMDLs were

22 established to basically regulate the load or the
23 concentration of drain waters from Camp 13, could you
24 describe whether or not those applications and the
25 application of TMDLs would be helpful in regard to Camp

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1 13's drainage management of salinity and selenium?

2 MR. WHITE: Sure. In our view, the purposes of TMDLs
3 in this area is basically to require, or force that the
4 high salinity and selenium be stored in the soil profile.
5 This is pointing out the area of Camp 13 on the map. And
6 just to the north of it is Central California Irrigation
7 District, or -- the beginning of the rest of the District.

8 As this poor-quality water is stored within the
9 drainage area and tile sumps are shut off to meet those
10 TMDLs, it increases the pressures on the surrounding
11 grounds and actually intends to increase discharges from
12 some of the other surrounding tile sumps. So to a degree
13 TMDLs will shut down tile sumps in that area and cause a
14 bigger problem for the District.

15 MR. MINASIAN: Now, Mr. White, that's a good summary.
16 Let's get into some detail about this. Central California
17 Irrigation District has been involved in drainage issues
18 since the early 1960's, has it not?

19 MR. WHITE: Yes.

20 MR. MINASIAN: And as assistant manager of the
21 District you have access to the records of the District and

22 you keep track of what the District has done in regard to
23 anticipating drainage problems?

24 MR. WHITE: That's correct.

25 MR. MINASIAN: And do the records of the District

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1 reflect that the drainage conditions, the high-water
2 conditions, the installation of tile drains, the salinity
3 and selenium have basically increased over the years in the
4 Camp 13 area?

5 MR. WHITE: Yes, generally, they show that.

6 MR. MINASIAN: And do the records of the District
7 also reflect that the District is participating in an
8 effort to get the Bureau of Reclamation to comply with the
9 San Luis Act?

10 MR. WHITE: Yes.

11 MR. MINASIAN: Okay. Is Exhibit 4C basically an
12 excerpt from the San Luis Act? And we've heard a lot about
13 this.

14 MR. WHITE: Yes.

15 MR. MINASIAN: If you move it so the red part shows,
16 Mike, all the way up.

17 Is this a copy of the San Luis Act and the
18 language which included a requirement of constructing a
19 drain for the San Luis unit land?

20 MR. WHITE: Yes, it is.

21 MR. MINASIAN: And are the San Luis unit lands

22 basically upslope of Camp 13?

23 MR. WHITE: Yes, they are.

24 MR. MINASIAN: Okay. Now, did the Central California

25 Irrigation District go to court in 1963, and 4D will be our

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1 next exhibit, because the drain had not been constructed
2 and, yet, the Bureau was moving forward with the
3 implementation of a agricultural distribution system for
4 the San Luis unit?

5 MR. WHITE: That's correct.

6 MR. MINASIAN: Okay. And did Judge Crocker basically
7 tell the Central California Irrigation District that it
8 would not issue an injunction?

9 MR. WHITE: Correct.

10 MR. MINASIAN: And is 4D a copy of his order, and on
11 the second page of the order as Item 2 he finds that there
12 is, in fact, a requirement in the Act of drainage, does he
13 not?

14 MR. WHITE: Yes, it is. And, yes, it does.

15 MR. MINASIAN: All right. And on the second page,
16 the next page of the order, did he tell the Exchange
17 Contractors why he was not going to issue an injunction?

18 MR. WHITE: Yes, because of assurances received by
19 the Bureau that it would be completed.

20 MR. MINASIAN: And basically the red language is,
21 (Reading):

22 "The defendants, the United States, herein have
23 through the United States' Attorney represented
24 to this Court that required drainage will be
25 provided by the time water is furnished to the

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1 Federal San Luis unit area"?

2 MR. WHITE: That's correct.

3 MR. MINASIAN: Now, there was testimony earlier in
4 this proceeding by Mike Delamore about what he and his five
5 officemates in Fresno were asked to do by the Bureau in
6 regard to the drainage problem. And you've been with the
7 Central California Irrigation District since approximately
8 1991; how would you describe the activities of the United
9 States in moving towards building the San Luis Drain, or
10 the master drain?

11 MR. WHITE: I've been with the District since 1993,
12 Paul.

13 MR. MINASIAN: Thank you.

14 MR. WHITE: So far as I know there's been no progress
15 toward the construction of the drain during that period of
16 time.

17 MR. MINASIAN: Did the District go back to court in
18 1967 when the San Luis unit was about to receive water and
19 file another action?

20 MR. WHITE: Yeah, that's correct.

21 MR. MINASIAN: And do the records reflect that, in

22 fact, shortly thereafter the intermediate section of the
23 San Luis Drain was, in fact, built?
24 MR. WHITE: Correct.
25 MR. MINASIAN: And that's 4E. We wouldn't go through

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1 each of these in great detail, but has the Central
2 California Irrigation District and the Firebaugh Canal
3 Water District and various landowners and groups within the
4 area gone to court in each instance in which there's been a
5 change like the cutoff of the collector system, the failure
6 to come forward with a program to provide drainage in the
7 early '90s, again, joining with Westlands in the most
8 recent action to try to enforce an obligation to deal with
9 this matter?

10 MR. WHITE: That's correct.

11 MR. MINASIAN: And in each instance do you see the
12 water right holder, the Bureau of Reclamation moving
13 towards building the drain, or do you see them holding
14 back?

15 MR. WHITE: Well, we see the assurances, but we still
16 see them holding back.

17 MR. MINASIAN: Now, Mr. Deverel, would you take a
18 moment and turn to Section 11 of your testimony.

19 DR. DEVEREL: Page 11?

20 MR. MINASIAN: Actually, the paragraph labeled "11,"
21 which you'll find on Page 24 -- 25. And you've sat and

22 heard a lot of the testimony in regard to some flows across
23 district boundaries. And you've listened to a good deal of
24 the testimony. We're not going to point fingers today, are
25 we, we're going to talk about physical principles so the

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1 Board has your understanding of what happens out there
2 physically; is that correct?

3 DR. DEVEREL: That's correct.

4 MR. MINASIAN: Have you done work in regard to trying
5 to estimate whether or not there is cross-boundary flux
6 flow involving the boundary between Westlands and Firebaugh
7 Canal?

8 DR. DEVEREL: I've done some work trying to sort that
9 out over the last few years. I developed a groundwater
10 flow model for Firebaugh Canal Water District and
11 surrounding water districts and looked at that flux across
12 that boundary, specifically the flux of Firebaugh when --

13 THE COURT REPORTER: I'm sorry, you trailed off at
14 the end. "Specifically the flux --

15 DR. DEVEREL: Across the boundary with other water
16 districts.

17 MR. MINASIAN: And did you also have an opportunity
18 to review work done by a groundwater hydrologist named
19 Mr. Ken Schmidt who works in California and Arizona?

20 DR. DEVEREL: Yes. I reviewed Ken Schmidt's work.

21 MR. MINASIAN: And Mr. Schmidt actually installs and

- 22 tests wells and did test out there?
- 23 DR. DEVEREL: That's right. Ken Schmidt in 1987
- 24 conducted pump tests right at the boundary of Firebaugh
- 25 Canal Water District with Westlands Water District.

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1 MR. MINASIAN: Okay. Did you come up with a higher
2 estimate than the estimate given by Mr. Johnston on an
3 annual basis?

4 DR. DEVEREL: I came up with a number around 235
5 acre-feet per year per mile of the boundary.

6 MR. MINASIAN: And is there about four miles of
7 boundary?

8 DR. DEVEREL: About four miles of boundary, so around
9 a thousand.

10 MR. MINASIAN: Okay. And give us a typical water
11 quality for your estimate of the flux.

12 DR. DEVEREL: The TDS that I estimated based on Ken
13 Schmidt's measurements was about 3300 milligrams per liter
14 TDS.

15 MR. MINASIAN: And selenium?

16 DR. DEVEREL: Selenium was on the order of 100, as I
17 recall.

18 MR. MINASIAN: You also did an estimate to try to
19 come up with an idea of how much load goes outside of
20 Firebaugh, as an example, and how much of that load may
21 originate from areas other than the Firebaugh Irrigation

22 District?

23 DR. DEVEREL: That's right. I used the groundwater
24 flow model along with some salute transport modeling to try
25 to estimate the cumulative amount of load that was ending

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1 up in Firebaugh as a result of water crossing the boundary.

2 Through 1996 I estimated that number to be about 30

3 percent.

4 MR. MINASIAN: Okay. That is 30 percent of the load?

5 DR. DEVEREL: 30 percent of the load, right.

6 MR. MINASIAN: Is basically attributable to

7 activities other than Firebaugh's farming actions?

8 DR. DEVEREL: That's right.

9 MR. MINASIAN: Is this information helpful to the

10 Board in terms of deciding whether or not TMDLs placed upon

11 discharges within Firebaugh Canal, or Camp 13, will

12 actually get at the selenium problem in the San Joaquin

13 River?

14 DR. DEVEREL: Well, I think it points to the regional

15 nature of the problem. This and other influences

16 contribute to drainage flows in downslope areas. There's

17 always going to be an upslope influence. And I think it

18 points to the regional nature of the problem and the need

19 for a regional solution.

20 MR. MINASIAN: Okay. We also --

21 MEMBER FORSTER: Excuse me?

22 C.O. CAFFREY: Yes, Ms. Forster.

23 MEMBER FORSTER: You didn't say "yes" or "no" to his

24 question.

25 MR. MINASIAN: Is it helpful?

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1 MEMBER FORSTER: Is it helpful for you to say "yes"
2 or "no"?

3 DR. DEVEREL: Yes, I think it would be helpful.

4 MEMBER FORSTER: All right.

5 MR. MINASIAN: All right. We also heard from
6 witnesses in the portion of the direct case in regard to
7 groundwater elevations rising and, therefore, there being a
8 pressure influence. And you may remember there was some
9 talk about that with Mr. Johnston yesterday, a ridge, a
10 mound?

11 DR. DEVEREL: That's right.

12 MR. MINASIAN: Okay. Have you studied the area that
13 was focused in on by Mr. Johnston in regard to the
14 boundary?

15 DR. DEVEREL: I've not studied it in terms of looking
16 at hydraulic pressures in great detail. I have looked at
17 how the hydraulic gradients may have changed in that area
18 over the last 30 years or so.

19 MR. MINASIAN: Okay. And part of your work for the
20 USGS was looking at the flow patterns, the pressure
21 gradient and affects upon flows of saline water in the

22 whole area, was it not?

23 DR. DEVEREL: That's right.

24 MR. MINASIAN: Just to get this out of the way, just

25 focus on the ridge area, the area that we were talking

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1 about as a boundary. Were the maps we were looking at
2 basically 1984 data?

3 DR. DEVEREL: That's right. Ken Belitz developed
4 those maps based primarily on the water level data in 1984.

5 MR. MINASIAN: And has there been a change in that
6 area which you could generalize for the Board since '84 to
7 now?

8 DR. DEVEREL: There's indication that as part of
9 other work that we're doing that water levels have risen,
10 continued to rise in that area specifically at the
11 groundwater divide and west of the groundwater divide.
12 I've seen numbers, seen data to indicate that water levels
13 have risen as much as 10 to 15 feet near the divide.

14 MR. MINASIAN: So that's '84 to now, through a
15 drought, through wet periods they continue to rise?

16 DR. DEVEREL: That's right.

17 MR. MINASIAN: Okay. Is it important in your mind to
18 know exactly where the boundary is, or the ridge that
19 Mr. Johnston described in terms of dealing with salinity in
20 the area, continuous sustainability of farming, or the
21 salinity in the San Joaquin River?

22 MR. BIRMINGHAM: I'm going to object to the question
23 on the grounds like about 60 percent of the questions asked
24 by Mr. Minasian is compound.
25 MR. MINASIAN: Okay. Let me break it down.

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1 MR. BIRMINGHAM: I know he's trying to move it along
2 very quickly, and I haven't objected, but maybe he could
3 ask the questions one at a time.

4 MR. MINASIAN: I would be glad to. Thank you.

5 C.O. CAFFREY: Thank you, Mr. Minasian.

6 MR. MINASIAN: Do you know exactly where the ridge is
7 today based upon the changes in water condition?

8 DR. DEVEREL: No, I don't. It's probably worth
9 pointing out that even the estimate in 1984 was not as
10 accurate as the water table contours that are applied on
11 that map. There's substantially less data that was used to
12 delineate that groundwater mound, or groundwater divide
13 back at that time. So there is a fair amount of certainty
14 in where that divide was in 1984, probably I would say
15 within a mile or two either way. So there was uncertainty
16 at that time. In fact, water levels have risen since then;
17 makes it even more uncertain now.

18 MR. MINASIAN: Okay. If one wanted to try to correct
19 the salinity conditions in the San Joaquin River, would one
20 spend a lot of time as a scientist trying to figure out
21 where the boundary is?

22 DR. DEVEREL: I don't think so. I think that it's an
23 important feature of the overall groundwater flow system,
24 but I don't think it's worth spending a lot of time trying
25 to identify exactly where it leads to.

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1 MR. MINASIAN: As a scientist what would you ask the
2 Board to do and to focus upon in terms of trying to
3 understand the way salinity is to be managed and the way
4 salinity reacts in this whole area?

5 DR. DEVEREL: Well, I think as stated earlier in
6 response to an earlier question, I would submit that a
7 regional look needs to be taken at the influences on drain
8 flows and draining loads. Clearly, there are hydraulic
9 influences from upslope areas to downslope areas. And
10 that's really the key issue, not so much where the divide
11 is, but what are the hydraulic influences and how do they
12 influence drain flow downgradient.

13 MR. MINASIAN: Could you put 5B on the stand, and
14 while Mr. Sexton is doing that, is 5B which is found
15 immediately after Page 1 in your testimony, Mr. Deverel, is
16 it a map showing the changes in groundwater level from 1952
17 to 1984 in an area in which the Exchange Contractors,
18 Panoche Water District are basically situated?

19 DR. DEVEREL: This is a cross-section that extends
20 from the base of Panoche fan here up to approximately the
21 edge of the valley deposits. The Exchange Contractors are

22 actually east of this cross-section. So this is right at
23 the edge of Broadview and Firebaugh Canal Water District.
24 MR. MINASIAN: Okay. And what does that diagram show
25 is happening between 1984 and 1952?

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1 DR. DEVEREL: Well, this is based on USGS data from
2 both those periods. The 1952 water table was mapped based
3 on reports done by Polland and others. And it shows a
4 substantial groundwater table rise from 1952 to 1984. This
5 is the result of two factors, actually.

6 One, in 1952 and prior to 1952 the main source of
7 water, of course, for the valley was groundwater pumping.
8 Pumping began to decrease about 1952 in this area. And at
9 the same time surface water was delivered and so there was
10 a rise in the water table, in increasing groundwater
11 storage during that time. We also see the development of a
12 groundwater divide which is about here.

13 MR. MINASIAN: And what's the significance of the
14 rise of groundwater levels today in terms of the management
15 of salinity in drainage waters?

16 DR. DEVEREL: Well, it's increased the area that is
17 in need of drainage or influences the water table. So
18 basically we've gone from an area over here that has
19 drainage in the 1950's to this area which is now subject to
20 a shallow water table, while the water table within 10 feet
21 of land surface.

22 MR. MINASIAN: Would you put up 5C, please,

23 Mr. Sexton.

24 Is 5C basically the generalized geohydrological

25 cross sections in the area from the drainage report, the

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1 Rainbow Report?

2 DR. DEVEREL: Yes.

3 MR. MINASIAN: Okay. Now, this shows the water table
4 fairly close to the surface of the ground in the area from
5 Mendota over into the Westlands Water District, does it
6 not?

7 DR. DEVEREL: That's right.

8 MR. MINASIAN: What is the significance of that for
9 the Board in terms of understanding what can be done about
10 the salinity both for the farmland and for the protection
11 of bodies of water?

12 DR. DEVEREL: Well, the significance is similar to
13 what we discussed for the previous diagram. This basically
14 shows somewhat the same thing, you've got a shallow water
15 table and -- slowly sloping gradient towards the axis of
16 the valley. So there's a groundwater flow, flow gradient
17 that goes from this area toward the access of the valley.

18 MR. MINASIAN: Is the geology uniform homogeneous, or
19 heterogeneous?

20 DR. DEVEREL: It's actually quite heterogeneous. As
21 you can see here there's the influence of the Sierra Nevada

22 sediments, but within the coast range alluvium, as was
23 discussed yesterday, it's actually considered a
24 semiconfined aquifer which means there's various lenses of
25 course-grain and fine-grain materials.

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1 MR. MINASIAN: And so transmissivity can vary from
2 one end of the field to another if you look down into the
3 soils; is that correct?

4 DR. DEVEREL: It can vary substantially with depth
5 and area.

6 MR. MINASIAN: Okay. And so how is that helpful to
7 the Board to know?

8 DR. DEVEREL: Well, I think it helps to explain some
9 of the discrepancy, or some of the disagreement about flow
10 across the boundary and how flow can vary across the
11 boundary, or any one system, actually. If you look at
12 different layers you're going to come up with different
13 values for hydraulic conductivity. And this will result in
14 different estimates for flow along the flow path.

15 MR. MINASIAN: How does water conservation affect
16 drainage? Is it a long-term solution? And this is on Page
17 4 of your testimony.

18 DR. DEVEREL: We looked at trying to make some
19 statements about how water conservation would affect
20 drainage loads. And what we found was in the data that
21 increasing flows led to increasing loads.

22 MR. MINASIAN: Wait a minute. The more water you put
23 on the ground the more load of salt you're getting off. I
24 thought you were diluting the salt that's in the soil.
25 DR. DEVEREL: Well, there's two parts to the answer

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1 to that question. One is, empirically, as you look at the
2 data, in general, everywhere I've looked there are
3 increasing loads with increasing flows. That means, in
4 general, and as per some work that we've done specifically
5 in the San Joaquin Valley that there are -- as you apply
6 more water, as you increase the recharge rate there's more
7 load coming out of the drain. There's greater flow as well
8 as greater load coming out of the drainage system.

9 There's two factors that result in that one is --

10 MR. MINASIAN: First of all, let's ask: Is the
11 principle generally applicable both within the areas which
12 we'll refer as to the San Luis unit and the areas below
13 them in the Exchange Contractor, is that principle also
14 applicable within the South Delta area?

15 DR. DEVEREL: Specifically within the South Delta I
16 wasn't able to obtain data, but there was data that we were
17 able to look at in the Central Delta as well as in the
18 western Delta that indicated that loads increase with
19 flows.

20 MR. MINASIAN: 5G, please, Mr. Sexton. And you
21 basically plotted out loads versus drain flows. And based

22 upon those calculations in various areas have you seen a
23 correlation, the more water applied to the ground the more
24 load that comes off, not just quantitatively but in terms
25 of the quantity of salt?

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1 DR. DEVEREL: Well, to answer your question this
2 graph shows a number of different data sets for -- that
3 come from different sources and at different scales of
4 observation. On Orwood Tract -- well, Orwood Tract is in
5 the South Central Delta, we had some data that I collected
6 back in the early '90s. I plotted that and drain flow --
7 or salt load versus drain flow and that indicates an
8 increasing load to the flow as does similar data that we
9 collected on Sherman Island at that time. There's not a
10 lot of data, but what data there is indicates that there is
11 this increase in load.

12 MR. MINASIAN: Would you go to Exhibit 5F,
13 Mr. Sexton. Is 5F a similar diagram for the Grasslands
14 area?

15 DR. DEVEREL: Yeah, this is Regional Board data. And
16 we -- I plotted the same thing only it's on an annual
17 basis. So this is data from 1986 -- you've got the wrong
18 one.

19 This shows total flows and loads. Again, Regional
20 Board data 1986 to 1995. And, again, we plotted annual
21 loads versus flow. And, again, you see an increase in load

22 with the flow. This helps explain a little bit what's
23 going on, I think. If you look at the concentration versus
24 flow, you see that the concentrations begin to decrease
25 substantially at the highest flow rates.

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1 So, in general, the concentration stays somewhat
2 the same within a certain range of flow, but as you
3 increase the flow there is a decrease in concentration, but
4 it's generally not enough to offset, but increase in load
5 caused by increase in flow.

6 MR. MINASIAN: In a moment we'll get to why this
7 happens this way, but did you also study the Patterson
8 area, did some drains in the Patterson area, did you find
9 the same sort of correlation?

10 DR. DEVEREL: There was data available, again,
11 Regional Board data from the 1970's that we looked at in
12 the Patterson area. And we saw a similar relation to what
13 we see here. Again, it was instantaneous flow and load
14 data. And it appears from the data that, again, the load
15 increases with increasing flow. And if you look at the
16 concentration versus time, there is some decrease in
17 concentration of flow but not a substantial amount and not
18 enough to offset the increase in load caused by increase in
19 flows.

20 MR. MINASIAN: And that's Exhibit 5H, is it not?

21 DR. DEVEREL: That's right.

22 MR. MINASIAN: Okay. Now, what are the processes
23 which basically result in the fact that if you put on more
24 water to the ground you will tend to pump more load into
25 the receiving waters from the drainage? And let's first of

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1 all look at a diagram that shows typical tile drain, which
2 is 5I.

3 MR. SEXTON: I don't have that one.

4 C.O. STUBCHAER: Mr. Chairman?

5 C.O. CAFFREY: Yes.

6 C.O. STUBCHAER: While we're waiting just to clean up
7 the record, perhaps, a little bit, I believe you said
8 concentration versus time, I didn't see a time schedule
9 there.

10 DR. DEVEREL: I'm sorry, if I said that I meant
11 concentration versus flow.

12 MR. MINASIAN: Thank you.

13 MR. BIRMINGHAM: May the record reflect that
14 Mr. Sexton isn't nearly as good as putting up the overheads
15 as is any other person in the room.

16 MR. SEXTON: As is what?

17 C.O. CAFFREY: He didn't set a very high standard.

18 MEMBER DEL PIERO: Mike, he's giving you a hard time.

19 MR. MINASIAN: It may be my labeling system.

20 MR. SEXTON: It's your labeling. I'd like to show it
21 says "J."

22 DR. DEVEREL: This just shows the typical subsurface
23 drainage system as we've studied in the San Joaquin Valley.
24 We have tile drainage laterals, or drainage laterals aren't
25 necessarily made out of tile, but it varies somewhere

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1 between 6 and 9 feet.

2 Below land surface, they lead into a drainage sump
3 which in turn is the drainage water is pumped into some
4 kind of a collector ditch usually. We didn't -- in the
5 systems that I've looked at we didn't observe a soil
6 barrier with depth. This is a generalized diagram taken
7 out of a publication.

8 MR. MINASIAN: And this tile drainage system is
9 fairly typical for the area?

10 DR. DEVEREL: That's right for the Western San
11 Joaquin Valley, the Grasslands Bypass area.

12 MR. MINASIAN: Did you in the course of your work
13 with USGS and also as a private consultant do work in terms
14 of trying to figure out why loads did seem to increase with
15 the quantity of water that was placed upon the crop? And
16 is there a diagram 5M which will provide a useful tool to
17 explain the mechanism in your opinion?

18 DR. DEVEREL: We took about two years to look in a
19 fair amount of detail at a drainage system in the Broadview
20 Water District. This is a system that is operational on
21 about a field of 27 acres. We installed observation wells

22 at various depths. We measured drain flows in the drainage
23 laterals as well as the drainage sump. And we measured the
24 amount of water that was applied to the field during that
25 time. This is 1987 through 1989.

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1 MR. MINASIAN: So for two years or more you did an
2 intensive study in regard to certain test wells, certain
3 tile drainage systems and certain conditions upon a
4 particular piece of property within the Broadview Water
5 District?

6 DR. DEVEREL: That's right. We also developed a
7 groundwater flow model for this particular field in which
8 we attempted to model groundwater flow to the drainage
9 laterals and verified that with field data.

10 MR. MINASIAN: All right. Look at the top diagram.
11 There's lines on there leading to what look like pipes.
12 What are the pipes?

13 DR. DEVEREL: Those are the drainage laterals. This
14 is basically a cross-section through the field. This is a
15 6-foot drainage lateral. The drainage laterals in this
16 field are installed at different depths. There is a 6-foot
17 lateral and this was a 9-foot lateral.

18 MR. MINASIAN: So typically a tile drainage system
19 might be somewhere between 6 and 9 feet?

20 DR. DEVEREL: Typically, right.

21 MR. MINASIAN: Okay. And the top diagram basically

22 shows lines and arrows leading to those pipes. Now, how
23 did you develop those lines and what do we reflect?
24 DR. DEVEREL: These are lines generated by the
25 groundwater flow model. They basically show the flow of

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1 groundwater to the drainage laterals. This is during -- we
2 did two models. One, two-steady state models. One for
3 irrigating conditions and one for non-irrigating
4 conditions. And basically these lines are showing the flow
5 to the drainage laterals during irrigated conditions.

6 C.O. CAFFREY: Mr. Minasian?

7 MR. MINASIAN: Yes.

8 C.O. CAFFREY: Sorry to interrupt you, but we better
9 take our afternoon break now if we're going to take
10 advantage of our snack shop being open.

11 MR. MINASIAN: Good.

12 C.O. CAFFREY: Let's do that and be back in about 12
13 minutes.

14 (Recess taken from 2:45 p.m. to 3:01 p.m.)

15 C.O. CAFFREY: All right. We're back.

16 MR. MINASIAN: Mr. Deverel, did you and Mr. Fio write
17 an USGS published paper on the subject of the difference
18 between a recharge factor of .5 feet per year and a zero
19 recharge upon this particular field?

20 DR. DEVEREL: It was actually published in Water
21 Resources Research as a journal article, yes, that's true.

22 MR. MINASIAN: Okay. We were talking about the
23 concentric lines and variance between those lines. Could
24 you generally characterize the difference between the
25 elevation and the direction of flow of the lines leading to

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1 the tile drainage and their significance in forming your
2 opinion?

3 DR. DEVEREL: Yeah, let me walk through this as best
4 I can. The upper diagram, which I'm pointing to now, shows
5 irrigated conditions. So we've got concentric flow lines
6 that flow from the water table to the 6-foot drain for the
7 most part. And then we've got a regional flow system that
8 influences flow primarily to the 9-foot drainage lateral.
9 This Y-axis is in depth, in feet, so we had observations up
10 to about 90 feet in this particular case.

11 The bottom diagram shows non-irrigated conditions.
12 Both of these cross-sections show the results of our model
13 results which agree with hydraulic and water quality data
14 closely. The bottom diagram show flow to drainage
15 laterals. Under non-irrigated conditions there is zero
16 recharge. We had about a year of time to observe the field
17 when it wasn't irrigated. And, again, you can see
18 primarily a regional influence on flow to these drainage
19 laterals. In particular, the 9-foot drainage lateral has
20 collected water that was, in general, below -- about 25
21 feet below land surface.

22 MR. MINASIAN: I thought that the reason you
23 installed tile drainage was so a farmer could manage his
24 irrigation. What does the top diagram tell us about that
25 rationale?

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1 DR. DEVEREL: Let me say that the primary reason I
2 believe that tile drainage systems are installed the way
3 they are in the Western San Joaquin Valley is for salt
4 control. You could have them at shallower depths in a less
5 arid environment. But because there's so much evaporation
6 in the Western San Joaquin Valley relative to
7 precipitation, you need to put them at least 6 feet -- in
8 general, 6 feet or greater below land surface so you
9 prevent evaporation of the shallow water table and increase
10 salinization.

11 MR. MINASIAN: Now, in the upper diagram if we
12 imagine a farmer, he basically irrigated the field and .5
13 feet of water went beyond the root zone, did it not?

14 DR. DEVEREL: That's right.

15 MR. MINASIAN: Okay. And I thought that water would
16 go directly to the tile drainage. Isn't that the way it's
17 designed to work?

18 DR. DEVEREL: Well, some of that water goes into the
19 tile drain, but most of it goes into the groundwater
20 system. As you can see here what's flowing to drains is
21 mostly water that has recharged in previous years. The

22 numbers and the -- the number of years it takes for water
23 to travel along the flow path here range from about 3 or 4
24 years in this case and up to 8 to 9 to 10 years in cases of
25 some of these longer flow paths here.

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1 MR. MINASIAN: How can you possibly know that?

2 DR. DEVEREL: Well, these were calculations done by
3 the model, but we were able to verify those calculations
4 fairly well with the hydraulic data and the flow data. And
5 we also characterized to some -- in some detail the
6 groundwater chemistry. So we were able to use that to
7 determine the proportions of flow that were coming from
8 different layers and different ages of waters.

9 MR. MINASIAN: Now, the top diagram shows the quality
10 of the water in the vicinity of 7 feet to about maybe
11 between 5 and 6,000 parts, does it not?

12 DR. DEVEREL: The water adjacent and immediately
13 below the drainage laterals had a TDS of about 6,000 here.
14 As you go deeper in depth it actually decreases somewhat to
15 about 5600 TDS.

16 MR. MINASIAN: Okay. Do you know why the water at
17 approximately that level would be so high in TDS?

18 DR. DEVEREL: There's a couple processes that have
19 operated in this field. This field was drained in about
20 1970. Prior to the drainage system installation the water
21 table had risen within a few feet of land surface. We --

22 at least, that's what we hypothesized based on the water
23 chemistry data that we collected.
24 You can see if you look at the groundwater a
25 definite signature of evaporated water. And this water

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1 showed that signature. Using isotopic data we were able to
2 show that this water is generally more evaporated and was
3 present to a certain extent to land surface prior to the
4 drainage system installation.

5 MR. MINASIAN: Now, the load at the top of the field
6 that got .5 feet past the root zone, the load is 307
7 kilograms. Whereas in the lower one where the farmer did
8 not allow any water to go past, because the ground was
9 basically unirrigated, the load was 268 kilograms.

10 DR. DEVEREL: That's right. There's a substantial
11 load that's the result of just regional flow to this mark,
12 regional influences forcing water into this drainage
13 lateral.

14 MR. MINASIAN: So describe to us, if you can, the
15 pressure mechanism which is feeding the tile drainage
16 system in the lower diagram when there's no water being
17 applied on the ground in terms of land retiring.

18 DR. DEVEREL: Well, let's consider the case where we
19 would retire this land. If you retired this land you would
20 continue to have drain flow, as we're observing here for
21 the most part, depending on what else you did to

22 neighboring fields. But, in general, because there is a
23 regional influence on this drainage lateral, in other
24 words, water is flowing through this drainage lateral even
25 though there's no irrigation taking place in the field

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1 there's going to be drain flow, a substantial load of salt
2 coming out of this drainage lateral regardless of whether
3 you irrigated it or not.

4 MR. MINASIAN: Now, in terms of your hypothesis that
5 the water conservation would reduce load upon fields that
6 are irrigated, what's the top diagram versus the bottom
7 diagram tell us is happening to actually increase the load
8 when you let water pass the root zone in a nonconservation
9 mode?

10 DR. DEVEREL: Well, let me answer that in two parts.
11 We, as I mentioned, developed a groundwater flow model for
12 these two different cross-sections. These are the result
13 of two different modeling efforts.

14 And we also looked at scenarios where we increased
15 the recharge by increasing the amount of water applied to
16 the field. What that data showed was that the more you
17 increase the recharge rate, i.e., increase the application
18 rate, the higher the load got in the field.

19 The reason for that is we believe that there is an
20 increasing volume of water that gets pushed out towards the
21 drain by increasing, essentially, the hydraulic head, or

22 the forces acting on this water that has a high amount of
23 selenium and forcing that out the drain.
24 So intuitively one might think that -- or
25 sometimes it's thought that drainage systems collect,

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1 basically, irrigation water that's applied from the field
2 and it flows somewhat directly towards the drain. But
3 there's actually a fairly long travel time for water that
4 reaches the water table and makes its way to the drainage
5 lateral on the order of several years to a few decades in
6 some cases. So we have this constant fill and displacement
7 process, our displacement process towards the drainage
8 laterals over time.

9 MR. MINASIAN: So is the mechanism by which load is
10 increased primarily a pressure mechanism?

11 DR. DEVEREL: It's, of course, influenced by
12 pressure. The more pressure you apply the more water flows
13 out the drain. And, in general, that water is not
14 substantially diluted by water that might flow from the
15 drain from a more direct route via irrigation water or
16 dilution.

17 MR. MINASIAN: And while the water is taking those
18 years to travel toward the tile drain, is it by the
19 evaporation process and the root zone process it is being
20 concentrated?

21 DR. DEVEREL: In general, when the water table is

- 22 this deep as it is in this field there isn't a lot of
- 23 evapoconcentration taking place at the water table.
- 24 Usually for the most part evapoconcentration begins to
- 25 become a significant factor when water tables rise within 5

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1 or 6 feet of a plant's surface.

2 MR. MINASIAN: 5N, Mike. So based upon this and
3 other work that you've done, why is water conservation
4 likely to reduce loads coming out of drains?

5 DR. DEVEREL: Well, empirically, if you look at the
6 data, the data that we have available if you increase the
7 loads -- I mean if you increase the flow, in general, you
8 increase the loads. And if you decrease the flow you
9 decrease the loads.

10 The modeling that we did indicated that as you
11 decrease the application rate you decrease the salt load.
12 This is, actually, showing the results of the model. This
13 is the salt load coming out of the 6-foot drainage lateral
14 in kilograms per day per meter of drain. And this is the
15 flow rate, again, in meters cubed per day per meter of
16 drain.

17 As you look at observed data, which are these
18 diamonds, you can see, of course, increase in load to flow.
19 And this is our simulated values. They read pretty well.
20 We used a two-dimensional model. So it was extrapolated to
21 three dimensions in this particular case to predict the

22 salt load.

23 But I think what this indicates is that we have a
24 model that is verified by field conditions that indicates
25 that increasing loads are the result of increase in flows

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1 and that decreased application rates and increased
2 conservation will result in lower loads.

3 MR. MINASIAN: Mr. Hildebrand -- bringing this back
4 to the testimony, Mr. Hildebrand testified that it didn't
5 matter how much water was put on the South Delta lands,
6 they were basically putting salt on with the water and then
7 pumping it off.

8 Can you generalize and generally describe what
9 your opinion is in regard to that subject in the Central
10 Delta and the South Delta areas?

11 DR. DEVEREL: I don't have data for South Delta, but
12 data for the Delta area, in general, that I've looked at
13 indicates this same phenomenon. In other words, if you
14 increase flows you increase loads.

15 There are sources other than evapoconcentration of
16 salts by agriculture in the Delta. And these may be one
17 reason that there are increased loads with flows. But,
18 certainly, my looking at the situation, and we have done
19 some looking at hydraulic data for Twitchell Island,
20 indicates that the flow situation to drainage ditches in
21 the Delta is similar to flow to drainage laterals. In

22 other words, it takes a long period of time, there's this
23 displacement process and rates of flow are generally slow
24 towards drainage ditches in the Delta.

25 MR. MINASIAN: Okay. Would you put up 5-O,

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1 please, Mr. Sexton.

2 Generally, are opportunities in the South Delta
3 area to manage salts in the same way that your experiments
4 in Broadview, Firebaugh and Camp 13 areas and for the USGS
5 have confirmed to you that conservation can actually reduce
6 load?

7 DR. DEVEREL: Well, the data would indicate that it
8 certainly is worth looking at further. The available data
9 shows that decreasing flows and increase in conservation
10 decrease loads, then it would seem to behoove us to look at
11 conservation as a way of decreasing salt loading to the
12 Delta channels.

13 MR. MINASIAN: And we could play the tonnage game in
14 the South Delta, couldn't we, there are wide variations
15 estimates of how many tons of salt are discharged from the
16 drainage within South Delta Water Agency?

17 DR. DEVEREL: Yes, there are.

18 MR. MINASIAN: And rather than play that game, talk
19 to us for a moment about the mechanics of how conservation
20 could, in fact, improve the discharge of salt to the Delta
21 channels during certain periods of time.

22 DR. DEVEREL: Well, let me comment first on the
23 nature of the data and what that shows, I think that will
24 answer your question. There are some estimates we made of
25 salt loading to the Delta -- to the channels in South Delta

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1 Water District, or water agency, this is one of them. This
2 is input to the Delta simulation model that was provided by
3 the State Board during these hearings.

4 And, basically, it shows an average salt load from
5 drain to ag drainage discharge in the South Delta of about
6 126,000 tons per year. I calculated, based on the USGS
7 report that came out in '97 as well as using DWR MWQI data,
8 Municipal Water Quality Investigation Program data that
9 indicated about 140,000 tons per year being discharged in
10 the South Delta Water Agency.

11 So there is some agreement there, but certainly
12 the variation in this data is quite large. And there's
13 some uncertainty in those numbers. I think the point is
14 that other data for other parts of the Delta indicates that
15 if you increase conservation you can reduce loads. And I
16 think that indicates to me that it's worth looking at
17 further.

18 MR. MINASIAN: 5Q, please. Is basically the same
19 mechanism encountered in areas of the Delta in terms of
20 there being shallow high TDS water which is pushed by
21 pressure into drainage systems by a heavy application of

22 water on the surface?

23 DR. DEVEREL: This next diagram I think will help

24 answer that. This is, again, somewhat preliminary data --

25 let me scratch that. It's data that was collected in a

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1 project that I participated in at the University of
2 California back in 1979.

3 It's merely to indicate that there are places in
4 the Delta where we see a similar phenomenon in terms of
5 upward flow to drains. This, actually, doesn't show the
6 drainage ditches, but it was an experiment that we
7 conducted on Bouldin Island to look at flow during
8 irrigation events and between irrigation events.

9 And there are two things that I'd like to point
10 out here. One is that there is upward flow towards
11 drainage laterals from mineral material underlying the peat
12 deposits. These dots indicate the mineral material.
13 Overlying the mineral material is organic soil.

14 And the other thing is that the groundwater
15 quality decreases with depth. The water table is about 4
16 feet. And you have an increase in TDS of about a thousand
17 deciSiemens per meter. So there is this phenomenon in the
18 Delta where there's upper flow of lower quality water.
19 There is other data that indicates upper flow in the Delta.
20 There's also other water quality data. And I should point
21 out that not all the water quality data decreases with

22 depth. Their quality does not always decrease with depth.
23 Sometimes there are increases with depth.
24 C.O. CAFFREY: Mr. Minasian, Mr. Brown has a
25 question.

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1 MR. MINASIAN: Yes.

2 MEMBER BROWN: Excuse me, Mr. Minasian, if you would.

3 The upper fall that you're speaking of there, what's
4 causing that? Is there a hydraulic pressure on the other
5 end, or is it capillary action? What in your opinion
6 causes the upper flow from seemingly a lower-pressure
7 gradient to a higher one?

8 DR. DEVEREL: That's a good question. The Delta
9 islands are, I would characterize, as holes in water. So
10 they're -- the island surfaces are somewhere between 10 and
11 25 feet below land surface.

12 So there is pressure from the water level in the
13 channels that's generally around sea level. There is a
14 hydraulic gradient from the river channel to the center of
15 the island. That's the primary. There's upper flow, but
16 there are also groundwater areas where there's artesian
17 flows in the Delta.

18 MEMBER BROWN: Is that the same answer for the lands
19 in the San Joaquin Valley?

20 DR. DEVEREL: No. The San Joaquin Valley is the
21 result primarily of upslope pressures. You have increasing

22 hydraulic gradients in the upslope that cause the regional
23 flows to drain.

24 MEMBER BROWN: Thank you, Mr. Minasian.

25 MR. MINASIAN: Could you put 5P up to demonstrate the

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1 testimony.

2 MR. SEXTON: Five P or R?

3 MR. MINASIAN: "P" like Paul.

4 MEMBER BROWN: Thank you, Mr. Chairman.

5 C.O. CAFFREY: You're very welcome, Mr. Brown.

6 MR. MINASIAN: Is this 5P a typical Delta island?

7 DR. DEVEREL: This shows basically the situation I
8 just described to Chairman Brown, and that is that we have
9 the channel water that is about sea level. And the islands
10 in the Delta are protected by levees. And on the other
11 side of the levee we have island surfaces that range
12 approximately between 10 and 25 feet below sea level.

13 There is an island drainage collection system.
14 Typically there's a subsurface network of drainage ditches
15 that leads into a main collector channel which leads into a
16 sump, if you will, in which drain water is pumped out of
17 that collector line over the levee back into the channel.

18 MR. MINASIAN: Now, Bouldin Island is actually in
19 Central Delta not South Delta?

20 DR. DEVEREL: That's right.

21 MR. MINASIAN: And there's very little peat soil left

22 in the South Delta; isn't there?

23 DR. DEVEREL: That's right. There's some peat soil

24 left on the Union Island, but not very much.

25 MR. MINASIAN: In terms of water conservation, if the

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1 pressure that we're talking about on Bouldin or in this
2 drainage return diagram is basically pressure caused by the
3 water level on the outside of the levee, the farmer can't
4 do anything about that, can he?

5 DR. DEVEREL: No, not really.

6 MR. MINASIAN: And the farmer, however, can be aware
7 of the quality of the water he's pumping back into the
8 channel which his neighbor may be utilizing for farming
9 purposes?

10 DR. DEVEREL: That and there are, in my experience,
11 opportunities for water conservation on Delta islands. A
12 substantial amount of water is pumped over the levee
13 typically by way of siphons. My calculations indicated
14 based on this USGS report that about two-and-a-half feet --
15 or two-and-a-half acre-feet per acre of drainage water is
16 pumped from Central Delta islands back into the channel.

17 My experience in working on some of those islands
18 indicates that there's probably excess water that's brought
19 across the island and that amount of drainage volume could
20 probably be reduced.

21 MR. MINASIAN: So is it as simple as applying water

22 conservation to everybody in the area that drains into the
23 San Joaquin River and thereby simply improving salinity?
24 DR. DEVEREL: Well, I think that probably -- I would
25 hesitate to say everywhere, because it's a regional problem

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1 and there might be places where water conservation might
2 not be appropriate.

3 MR. MINASIAN: Okay. Are there areas where water is
4 applied and it recharges groundwater?

5 DR. DEVEREL: Certainly, in the CCID area north, the
6 area I've been speaking of which is the Grasslands Bypass
7 area. There are areas where it appears that the
8 groundwater system benefits by additional recharge in the
9 groundwater recharge.

10 MR. MINASIAN: And that's the area other than the
11 6,000 acres of Camp 13, the other 144,000?

12 DR. DEVEREL: That's right.

13 MR. MINASIAN: Mr. McGahan's testimony gave some hope
14 that management in a long-term could, in fact, provide for
15 reduction, or at least stabilization of salinity in the San
16 Joaquin River as a result of the experience in the bypass
17 area.

18 Are you acquainted with the efforts being
19 undertaken in the Grassland Bypass area?

20 DR. DEVEREL: Based on Mr. McGahan's testimony as
21 well as conversations and reading of materials, yes.

22 MR. MINASIAN: Have you included in your testimony
23 estimates of the amounts of land that will be subject to
24 bare-land evaporation basically salinized over the period
25 up to approximately the year 2000?

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1 DR. DEVEREL: I've included in my testimony estimates
2 that were completed during the San Joaquin Valley Drainage
3 Program. There are two graphs. One indicates the increase
4 in the acreage that's subject to bare-soil evaporation,
5 which basically means water table within 7 feet of land
6 surface.

7 And I've also included a predictive graph which
8 shows that increase out to the year 2040. Both of those
9 graphs show an increase in the amount of acreage due to
10 bare-soil evaporation over time.

11 MR. MINASIAN: Do you believe it's possible to manage
12 salinity so that conditions do not get worse in the San
13 Joaquin River without a master drain?

14 DR. DEVEREL: I believe that the water conservation
15 efforts and other efforts that are in place right now can
16 help the problem in the short-term. But it's my opinion
17 that there are two opposing forces that need to be
18 considered in terms of looking at the long-term and looking
19 at water quality in the river.

20 One force is the increasing need to regulate water
21 quality in the river. And the other force, which actually

22 forces the situation in the opposite direction, is the
23 increases we've just talked about, the acreage that's going
24 to be subject to bare-soil evaporation.

25 We've done some post-auditing of the Belitz's

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1 model that was used to predict those numbers. And it turns
2 out that it's true to those numbers. It appears that it
3 has predicted the water level rises that I talked about
4 earlier.

5 So it's my opinion that as time goes on there will
6 be increased pressures on areas throughout the Western San
7 Joaquin Valley and increased need for drainage that these
8 water conservation methods will not be able to resolve and
9 will not result in meeting the San Joaquin River water
10 quality standards.

11 And in final answer to your question, I believe
12 that the only way out of the situation really is some kind
13 of outlet for salt if we want to see agriculture continue
14 in the valley as we know it today.

15 C.O. CAFFREY: Mr. Brown has a question I believe,
16 Mr. Minasian.

17 MR. MINASIAN: Yes.

18 MEMBER BROWN: Clarification on your question: Did I
19 hear you say to help improve the problem in the San Joaquin
20 River, or to help improve the problem in the San Joaquin
21 Valley including the river?

22 MR. MINASIAN: Good question. Let's ask it. If you
23 improve the conditions in the San Joaquin River, do you
24 necessarily make the conditions worse on the farmland?
25 DR. DEVEREL: It depends on how that's accomplished.

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1 If we --

2 MR. MINASIAN: If you have a master drain, if you've
3 improved the river then you also probably improved the
4 conditions of the soil, have you not?

5 DR. DEVEREL: The master drain would allow an outlet
6 for this salt that's stored in the groundwater system. The
7 majority of the salt that's been leached out of the soils,
8 and in my opinion the key problem in terms of salinity with
9 respect to drainage systems is salt stored in the
10 groundwater. The drain would allow an outlet separate from
11 the river for those stored salts.

12 MR. MINASIAN: And if you improve the management of
13 the salt on the ground, on the farmland, basically, retain
14 it in the underground waters and improve the quality of
15 water in the San Joaquin River on a short-term basis, do
16 you inevitably result in more bare land, bare-soil
17 evaporation?

18 DR. DEVEREL: Yes, I believe that. That's going to
19 be a result of whether you build a drain or not, you're
20 going to have an increase to land subject to bare-soil
21 evaporation. The question is: What happens to that land?

22 Do you install drainage systems, or do you let
23 that water table continue to rise to some point and
24 increase the salinization of the groundwater as well as
25 the root zone?

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1 MR. MINASIAN: We've used a phase "bare-soil
2 evaporation" and we're not going to get too technical. 5D,
3 please, Mike.

4 Bare-soil evaporation is a condition which means
5 what to the farmer?

6 DR. DEVEREL: This is a term that was used by Ken
7 Belitz and others as they worked on the groundwater flow
8 modeling for the Western San Joaquin Valley. And it
9 basically just means that once the water table rises within
10 7 feet of land surface it's classified as an area where
11 there could be bare-soil evaporation.

12 This is true based on other experiments that have
13 been done. And I think I mentioned this earlier, that as
14 you decrease the depth of the water table, that evaporation
15 rate from the water table itself, this is exclusive of
16 transpiration by plants, increases exponentially as you get
17 above 6 feet.

18 So basically what we're saying here is that the
19 reason, as I mentioned before, the reason you install
20 drains is to prevent salinization of that groundwater and
21 salinization of the soils. If you allow this to continue

22 there's going to be a salinizataion of those areas where

23 there is bare-soil evaporation.

24 MR. MINASIAN: The previous exhibit which we don't

25 need to put up is 5D, and it basically traces the number of

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1 square miles that have been subject to bare-soil
2 evaporation since 1972 to 1988?

3 DR. DEVEREL: That's right.

4 MR. MINASIAN: That's basically 100 square miles to
5 200 square miles --

6 DR. DEVEREL: That's right.

7 MR. MINASIAN: -- have been lost? And 5E projects
8 going from about 210 square miles to about 305 square miles
9 up to 2040, the year 2040, does it not?

10 DR. DEVEREL: That's right.

11 MR. MINASIAN: And the period of 1972 to 1988 is
12 actually the period that the Bureau has been studying this,
13 isn't it?

14 DR. DEVEREL: That's right.

15 MR. MINASIAN: And when you have testimony in regard
16 to the advantage of setting TMDLs that are basically
17 usually set on the basis of the amount of water flowing off
18 a piece of property, what do your experience and your
19 observations tell you about TMDLs in term of their
20 effectiveness in terms of long-term dealing with the
21 drainage problem?

22 DR. DEVEREL: It relates to a question that you asked
23 earlier I think in that TMDLs are part of this push towards
24 increase in regulation of water quality in the San Joaquin
25 River. We can do so much to meet TMDLs, but imposing them

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1 without a regional solution I think wouldn't result in a
2 long-term resolution of the problem.

3 We can do certain things now such as water
4 conservation, possibly retirement of certain lands,
5 groundwater pumping might be another alternative in some
6 cases; these are mixtures of water management and land
7 management practices that can lead to meeting the water
8 quality standards in the river over the short-term.

9 I think over the long-term, those methods will not
10 work because of what we've seen in these two slides. And
11 that is that the area that's subject to need for drainage,
12 the hydraulic pressures associated with that are going to
13 cause those changes in land and water management practices
14 to not be as effective as they need to be.

15 MR. MINASIAN: Why don't we try to bring you to a
16 conclusion by putting 5R on the screen. Is 5R basically
17 another diagram that was prepared as a result of your and
18 John Fio's work and included within a publication?

19 DR. DEVEREL: Yes. This is a graph that was
20 presented in our Water Resources Research article authored
21 by myself and John Fio published in 1991. It refers to the

22 water levels in wells that we installed in the field and at
23 the edge of the field during that study of the drainage
24 system.

25 And as I mentioned, we studied the drainage system

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1 from 1987 through 1989. From October of 1988 to October of
2 1989 the field did not receive irrigation water.

3 MR. MINASIAN: So it was a non-irrigated, or a piece
4 of ground that we might imagine had been retired from
5 production?

6 DR. DEVEREL: One could imagine that.

7 MR. MINASIAN: Okay. And are the lines on there
8 basically test holes that you drilled to various depths to
9 check the water level?

10 DR. DEVEREL: These are -- this is a plot of water
11 levels against time.

12 MR. MINASIAN: And the top line is not the soil
13 surface, is it?

14 DR. DEVEREL: No, it's not.

15 MR. MINASIAN: Okay. And so, basically, by looking
16 at the scale to the left we can determine how much the
17 water rose or declined in a given month on a non-irrigated
18 field for basically two years, '88 and '89; is that
19 correct?

20 DR. DEVEREL: That's right. Part of '87, '88 and
21 '89.

22 MR. MINASIAN: Okay. And so if TMDLs had been
23 applied to this particular piece of ground and it had tile
24 drainage at about 6 -- you're in meters there, aren't you?
25 DR. DEVEREL: That's right.

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1 MR. MINASIAN: So you'd have to be at 3 meters to 6
2 meters, somewhere halfway in between. This property would
3 have flowed its tile drainage even though it is not being
4 irrigated?

5 DR. DEVEREL: That's right, even though it was not
6 being irrigated during this time the drains flowed the
7 entire time.

8 MR. MINASIAN: So if a TMDL had been applied to that
9 particular landowner, what would he have done to try to
10 prevent violation of the TMDL standard?

11 DR. DEVEREL: I suppose he probably would have just
12 plugged the drain, or he could have plugged the drain.

13 MR. MINASIAN: And in your opinion what affect would
14 that have in the region of the property?

15 DR. DEVEREL: Well, as we can see here, and I'm
16 pointing to the water levels in the upper diagram that show
17 the water levels in wells at the edge of the field, if you
18 look at the time that the field was not irrigated, we see a
19 rise during the preirrigation period in February and March
20 of about half a meter and then another quarter of a meter
21 approximately during the summer irrigation season.

22 So we have a total rise of about .75 meters, or
23 about two-and-a-half feet. And that's with the drainage
24 system operational. If the drainage system was plugged,
25 the water level rise probably would have been greater than

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1 what we see here.

2 MR. MINASIAN: And the effects upon the adjacent
3 farmer, or downslope farmer of plugging this system?

4 DR. DEVEREL: Well, it's hard to say with a lot of
5 certainty, but let's say that the water level rose higher
6 than it did under drain conditions, that could cause an
7 increase in hydraulic pressures on adjacent or downgradient
8 field.

9 MR. MINASIAN: Do you have an opinion as to whether
10 or not pressures may be caused on fields like this from
11 conditions that exist miles upslope?

12 DR. DEVEREL: Well, certainly the hydraulic pressures
13 we see in a case like this are probably the result of --
14 let me phrase that in a different way.

15 The influence of hydraulic pressure decays
16 exponentially as we move away from the source of the
17 hydraulic pressure. So the results of increase in water
18 levels that we see here are probably the result of
19 activities that are occurring pretty close by. But there
20 is in this case hydraulic gradient that extends for miles
21 upslope from this field.

22 MR. MINASIAN: So that dissipation factor is overcome
23 when there is a gradient from upslope to downslope to some
24 degree; is that correct?
25 DR. DEVEREL: Explain to me what you mean by the

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1 "dissipation factor."

2 MR. MINASIAN: Well, let me ask it in a different
3 way. If this Board asked you to identify the exact piece
4 of property that is causing pressure to cause this
5 condition, could you do it?

6 DR. DEVEREL: No, I don't think so.

7 MR. MINASIAN: Could you eliminate any lands that are
8 upslope from having a pressure impact upon this property in
9 a cumulative way?

10 DR. DEVEREL: Well, I would eliminate lands if one
11 could identify on the other side of the groundwater divide.
12 But, in general, we have a propagation of pressures that
13 extend from the groundwater divide to downslope areas that
14 kind of influence in a leap-frog way, if you will, neighbor
15 upon neighbor. So we do have this propagation of pressures
16 down through the system.

17 MR. MINASIAN: Mr. White, I know you've gone to sleep
18 for us. Could you take Exhibit 4F, Mr. Sexton, which is --

19 Mr. White, you prepared a detailed amended drawing
20 which is not the hand-drawn drawing that I included in your
21 testimony, is it?

22 MR. WHITE: That's correct.

23 MR. MINASIAN: You were provoked at me for including

24 your hand drawing in there, were you not? Is this a

25 diagram purporting to show from a side view a typical tile

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1 drainage installation in a field?

2 MR. WHITE: Typical in the lower lying areas such as
3 the Camp 13 area.

4 MR. MINASIAN: Okay. And is the slope of the ground
5 within the Camp 13 area and the Firebaugh Canal unusually
6 steep?

7 MR. WHITE: It's fairly steep, fairly steep ground
8 for CCID. It's about 10 feet to the mile.

9 MR. MINASIAN: And the tile lines that are shown here
10 are shown on a cross-sectional basis so one can see the
11 collector lines basically running with the slope of the
12 ground?

13 MR. WHITE: Yeah, that's right. You don't see the
14 interconnections that take off perpendicular.

15 MR. MINASIAN: There's been some talk about trying to
16 store water within the soil profile.

17 MR. WHITE: Right.

18 MR. MINASIAN: Do you have an opinion as to whether
19 or not that works in a Camp 13 type area?

20 MR. WHITE: That's something that the manager of the
21 Firebaugh Canal Irrigation District and the folks within

22 the Camp 13 area wish to pass along to the Board. They've
23 been constraining over the last two years to really meet a
24 real stringent loading standard in the river.
25 And they've had to set electrodes in their sumps

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1 and so forth in order to utilize as much of the storage
2 that is available and is presently being occupied. So
3 right now there is not -- where there are tile lines, there
4 is not much more storage available.

5 MR. MINASIAN: Why not? Are the tile lines
6 misinstalled, or could they be designed better?

7 MR. WHITE: There was some talk in the EIR to -- or
8 an example of control structures that could be utilized.
9 And this could be done, but we feel as an example on some
10 of these sumps in the Camp 13 and Firebaugh Canal area they
11 are shut off now. They begin to run water out of the sump
12 within about 8 hours. Storage, we think, is a matter of
13 days not months.

14 MR. MINASIAN: With the laser pointer on 4F would you
15 show the Board why if a particular tile line had a weir
16 installed and it was blocked off, why the water tends to
17 appear in surface drains?

18 MR. WHITE: Well, with the tile lines in operation,
19 obviously, the groundwater, the depth of the groundwater
20 would be deeper. As you try to encroach or utilize the
21 storage -- and with these load standards in place and as

22 stringent as they are, they're pushing the limits. They're

23 pushing the water right to the base of the root zones of

24 the plant.

25 MR. MINASIAN: And those load limits which you're

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1 referring to are the Grassland Bypass area selenium load
2 limits which are on an annual basis; is that correct?

3 MR. WHITE: That's correct. Yes.

4 MR. MINASIAN: Okay. So a farmer in this tiled
5 diagram is up to the point where he's about to violate his
6 allocation of selenium and he is shut off the tile line.
7 What happens in the field?

8 MR. WHITE: Well, the groundwater rises. And it's
9 typical farmland on the west side. There's surface drains
10 interconnecting throughout the field, throughout the
11 checkerboard fields there. There's a real danger that as
12 you bring in groundwater up it starts to actually run into
13 the drains, it starts to leach in.

14 MR. MINASIAN: With your laser pointer, explain to
15 the Board why the groundwater tends to show up if you shut
16 off a tile drain. Can you draw the level of the water if
17 you shut it off for 8 hours?

18 MR. WHITE: We have it represented. If you shut it
19 off for a period of time, it may be a few days or it may be
20 a matter of a week, but the groundwater rises fairly
21 quickly to intercept these drainage laterals maybe 3 to 4

22 feet without the drains in operation, or with reduced

23 drainage operation.

24 MR. MINASIAN: Mr. White, various witnesses talked

25 about load and concentrations, the City of Stockton,

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1 Stockton East Water District. Do you have information to
2 impart upon the Board as to which one is right, which
3 should the Board be talking about, load or concentration?

4 MR. WHITE: I'm not sure I have information. I just
5 have them pinned. This type of a scenario which is caused
6 by a loading, it's a real strict loading situation.
7 There's no credit given for the assimilative capacity of
8 the river. I mean if there's a lot of water flowing in the
9 river, there's still the same loading.

10 If the DMC water that's being delivered into this
11 area happens to be of a higher concentration, there's no
12 allowance for that. It's very strict. So what has to give
13 in the middle here is the farm. Whereas, we think if it
14 was a concentration-based standard --

15 MR. MINASIAN: During certain periods whether there's
16 assimilative capacity.

17 MR. WHITE: Thank you, that's correct.

18 C.O. STUBCHAER: Was that a question?

19 MR. MINASIAN: Yeah. Excuse me.

20 C.O. CAFFREY: That's one of those with a "Isn't that
21 true," at the end of it.

22 MR. MINASIAN: Yeah.

23 C.O. CAFFREY: Or you just raise your voice.

24 MR. MINASIAN: Give the Board an example and correct

25 my indiscretion there.

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1 C.O. CAFFREY: Mr. Brown has a question before you
2 answer that one, Mr. White.

3 Go ahead, Mr. Brown.

4 MEMBER BROWN: Before you move off of this,
5 Mr. Minasian, with 10 feet to the mile, you normally have
6 about a quarter mile tile runs?

7 MR. WHITE: Yes.

8 MEMBER BROWN: That gives you a fallout of
9 two-and-a-half feet?

10 MR. WHITE: Yes.

11 MEMBER BROWN: So you have a fallout two-and-a-half
12 feet, how do you build up a hydraulic head?

13 MR. WHITE: This is average ten feet to the mile.

14 MEMBER BROWN: Yeah.

15 MR. WHITE: We have to realize, too, one of the other
16 factors here is that there's only 25 percent of the area
17 that's tile drain. So if you can imagine from the end of
18 this --

19 MEMBER BROWN: Okay. All right. I see. Thank you.

20 MEMBER DEL PIERO: Mr. Chairman?

21 C.O. CAFFREY: Yeah, Mr. Del Piero.

22 MEMBER DEL PIERO: Is the tiling a function of the
23 agency, or is it a function of the private landowners?
24 MR. WHITE: It's been a function of the private
25 landowners.

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1 MEMBER DEL PIERO: You have no subsidy program that's
2 available through the agency for those private landowners?

3 MR. WHITE: No, we do not.

4 MR. MINASIAN: Do you have a monitoring program in
5 which you maintain piezometers to advise the landowners as
6 to the surrounding groundwater condition?

7 MR. WHITE: The District does monitor shallow
8 groundwater in this area, and throughout the District as a
9 matter of fact. These are located, observation wells are
10 located on one-mile intervals throughout the District.

11 MR. MINASIAN: Okay. Go back to concentrations
12 versus loads in regard to selenium and the way it's working
13 out there.

14 MR. WHITE: Okay.

15 MR. MINASIAN: It's a load standard, isn't it?

16 MR. WHITE: Yes.

17 MR. MINASIAN: Okay. It's December of 1998, there's
18 water flowing in the San Joaquin River, very few people are
19 using it for irrigation.

20 MR. WHITE: Right.

21 MR. MINASIAN: What's happening out on this piece of

22 property?

23 MR. WHITE: Still with requirements of the same load

24 standard that's been in place. And the idea here is that

25 if there is assimilative capacity, let's try to evacuate

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1 some of the storage so we can use it later.

2 MR. MINASIAN: What would be the advantage of the
3 evacuating some of the storage in December?

4 MR. WHITE: It could be utilized later when the
5 assimilative capacity in the river may be less.

6 MR. MINASIAN: When you store selenium do you tend to
7 store salt as well?

8 MR. WHITE: That's correct.

9 MR. MINASIAN: And how do you know where the water
10 level is in these tile drains? Is there a mechanism? Is
11 there an electrode?

12 MR. WHITE: Yeah, that's a mechanism.

13 MR. MINASIAN: Explain to the Board that don't know
14 about electrodes.

15 MR. WHITE: It's just a electrode or a probe that
16 goes down into the well, as soon as the circuit is complete
17 and the water touches this electrode the circuit is
18 completed, the well comes on.

19 MR. MINASIAN: So these are pump tile drainage
20 systems in general, are they not?

21 MR. WHITE: Yes.

22 MR. MINASIAN: Mr. Deverel, would you turn to Page
23 29. From a scientist's point of view with your experience,
24 is the individual farmer with tile drainage the key to
25 management of salts that are entering the San Joaquin

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1 River?

2 DR. DEVEREL: No. I would say that it's a regional
3 problem. It needs to be looked at in terms of developing a
4 regional solution. I think we've shown some data here this
5 morning that indicates that there are regional influences
6 on all growers, especially those in downslope areas that
7 can be -- that can't be controlled by individual farmers or
8 individual growers.

9 MR. MINASIAN: And is there a need to focus upon
10 raising groundwater levels in the region as a way of trying
11 to improve salinity in the San Joaquin River?

12 DR. DEVEREL: Say that again. Is there a need to
13 focus on rising water levels?

14 MR. MINASIAN: Yes, groundwater levels.

15 DR. DEVEREL: Well, I think that water management
16 practices that get at trying to minimize the water level
17 increase in the San Joaquin Valley will go part of the way
18 in terms of trying to resolve the problem. Certainly, it
19 will aid in the decrease of regional hydraulic pressures.

20 But the situation in the San Joaquin Valley is
21 such that we're basically filling up a groundwater bathtub,

22 if you will. We've got more water coming into the system
23 that's leaving the system through pumping, or drainage, or
24 flowing through the San Joaquin River. And it's going to
25 continue to fill up until it's pretty well -- until the

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1 water level is close to land surface all across the valley
2 I believe. And so we have to deal with that situation
3 somehow. And hydraulic pressures will continue to increase
4 over time whether we build a drain or not.

5 MR. MINASIAN: In the 1950's and '60s when the San
6 Luis Act was pronounced and the Bureau was promising the
7 drain, we had fins on cars. We do not have fins on cars
8 anymore, do we? Is that an old idea that no longer has any
9 applicability, that is, a master drain is just a farmer's
10 simple way of ignoring reality?

11 DR. DEVEREL: No, I don't think so. If we buy into
12 the idea that farming on the west side of the San Joaquin
13 Valley the way they exist today is something worth
14 conserving and something worth preserving over time, I
15 think we have to come to the realization that there has to
16 be an outlet for salts.

17 MR. MINASIAN: Thank you.

18 C.O. CAFFREY: You're very welcome, Mr. Minasian.
19 Thank you. This is probably as good a time as any to break
20 for today. Before we do that, though, let's find out what
21 the cross-examination arrangement is going to be.

22 By a showing of hands who would like to
23 cross-examine these witnesses? Let's see, Ms. Cahill,
24 Mr. Nomellini, Mr. Birmingham, Mr. Herrick for Mr. Brandt,
25 Ms. Harrigfeld. I have: Cahill, Nomellini, Birmingham,

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1 Herrick, Brandt and Harrigfeld. Did I leave anybody out?

2 All right those will be the cross-examiners
3 tomorrow. We have half a day tomorrow. So, Mr. Herrick,
4 it looks like your announcement this morning that we
5 wouldn't have your witnesses until next week didn't cause
6 any never mind, to use an old saying.

7 MR. HERRICK: So I still have a chip to use later
8 maybe?

9 C.O. CAFFREY: Absolutely.

10 C.O. STUBCHAER: Depends on what you want to cash it
11 in on.

12 C.O. CAFFREY: We'll see you all -- excuse me,
13 Mr. Del Piero would like me to announce, and I should have
14 anyway, he's going to be sitting on the Air Resources Board
15 tomorrow on an MTB issue as it pertains to the impact of
16 two-cycle engines on surface waters. So he would love to
17 be here with us tomorrow, but we have a part in that play
18 tomorrow, and Mr. Del Piero will be representing us.

19 MEMBER DEL PIERO: We'll get the MTB problem taken
20 care of tomorrow afternoon.

21 MR. BIRMINGHAM: Where is that going to be, can we go

22 to that?

23 C.O. CAFFREY: He did the oceans and MTB in two days

24 and the Delta, we can't do. All right. We'll see you

25 tomorrow at 9:00 a.m. Thank you.

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1 (The proceedings concluded at 4:01 p.m.)

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